INDUSTRIAL ARTS AND VOCATIONAL EDUCATION

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Laminating: One of the newer areas of space-age woodworking (see page 38)

☐ Blueprint for Industrial Education, Ruley (pg. 14)

☐ Round Table: Should Organizational Patterns for Industrial Arts Change? (pg. 18)

☐ How to Improve the Teaching-Learning Environment, Rose (pg. 21)

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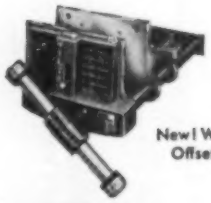

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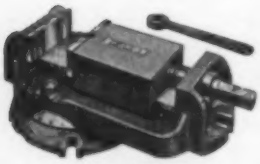

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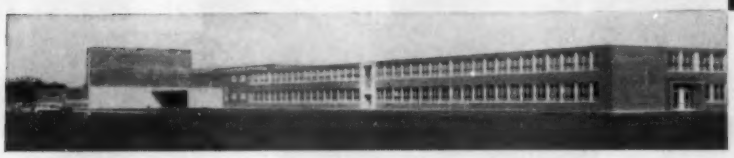

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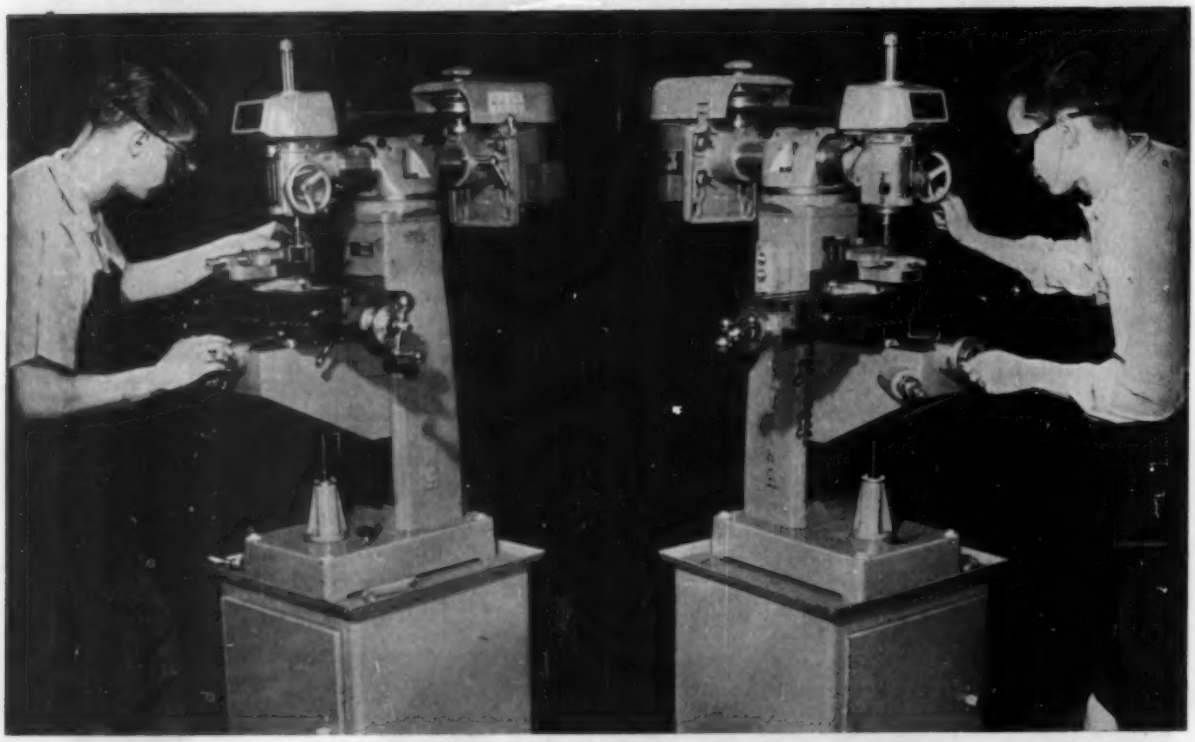

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December, 1961 Vol. 50, No. 10

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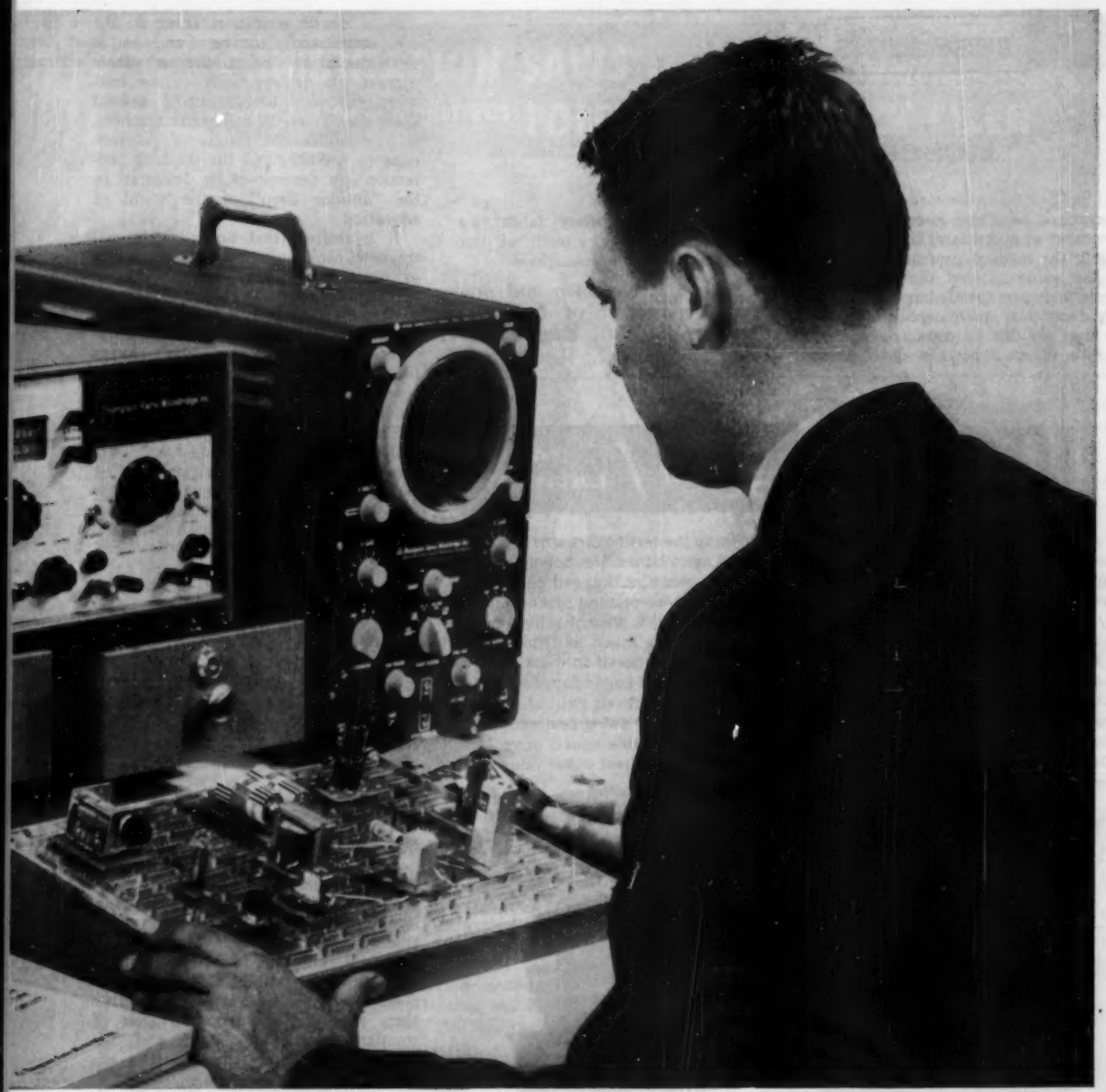

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research

Research and You

Research is basic and essential to the development of every facet of our lives. Certainly the medical profession recognizes the value of and the need for research. Industry spends large sums of money every year on research projects. They must do this to remain competitive with others who are developing new products and better fabricating processes. The entire growth of our civilization rests upon research.

Dr. Spence is chairman and professor, Department of Industrial Education and Art, Kansas State College, Pittsburg.

So it is with education. If we do not constantly strive for new and better methods of fostering the educative process, we deserve some of the criticism that is currently being heaped upon us. If we, as industrial teachers, do not utilize the results of research done by industry and the teaching profession, we deserve to be delegated to the "antique shop" of the world of education.

It is realized that not all industrial teachers can or want to be producers of research. However, to be effective teachers every one of us must be consumers of the researches of others. We are all affected by change, new developments, and the discovery of better ways to do things. These changes must be reflected immediately in our teaching of industrial subjects.

The junior high school teacher who is still conducting a year-long hand wood experience for his students is ignoring all the tremendous developments of the past 100 years. The senior high teacher who is building toy motors and crystal radio sets is behind times. He is cheating his students by not exposing them to the developments and potential of transistors and other new electronic devices.

The world of industry that we must present to youth in our classes today is becoming increasingly complex. The teacher of today can no longer get by on the skill of his hands alone. Research has changed the entire complexion of our industrial society.

A State of Growth

Research in industrial education has been in a state of growth during the past 30 years. A study by Feirer[1] covering the years 1930–46 found that research in industrial arts education during this period was in "an embryonic stage because of the newness of the field, the limitations of the facilities for graduate training, the emphasis placed on practical experience rather than academic training, the lack of standardization of content and the changing nature of the activities offered." Dr. Feirer found that the training of graduate students (in the years prior to 1946) in methods of research had been seriously neglected.

A study made twelve years later by King[2] indicated that there was considerably more interest and activity in research at the college and university level in the area of industrial education. This is highly commendable but brings to the fore the question "What happens to these graduate students after they have met the requirements for a degree?" Apparently, most of them settle back and become consumers of research. Very little research seems to be in process in industrial education by men

[1] Feirer, John L., *Research in Industrial Arts Education*, Western Michigan University, Kalamazoo, 1948, p. 5.

[2] King, Thomas G., *Fundamental Procedures of Research for Industrial Education*, Wayne State University, Detroit, Mich., 1958.

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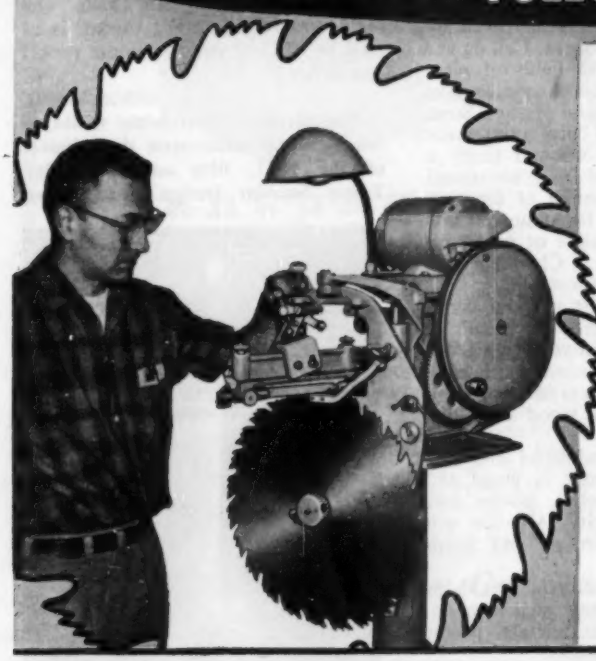

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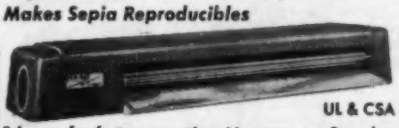

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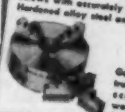

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news

A proposed **three-year plan to widen the scope of industrial arts education** in Pinellas schools was approved by the district's school board. Calling for new programs in the fields of electricity, power mechanics and metals, including aluminum and plastics, Supt. Floyd Christian said "our youth needs opportunity to explore and study a variety of industrial and vocational patterns and the content of the program of instruction for industrial arts should be representative of major industrial occupations." Christian proposed the following timetable:

1961–62 — All first year industrial arts will include areas in electricity and wood. Some first-year shops will be ready to include power mechanics. There will also be areas in metals and a revision in areas of wood and allied materials.

1962–63 — All industrial arts first year will include work in wood and allied materials, metals, power mechanics and electricity. A guide will be developed for second and third-year shops.

1963–64 — All industrial arts shops at all levels will show sequence development in woods, metals, power mechanics and electricity. □

Increasing stress on vocational-industrial education in Arkansas is the result of co-operation between public school and private groups. New industry in the state led to the creation of the Arkansas Industrial Apprenticeship and Training Committee which develops the program; the state educational department provides instructors and local school facilities. Charles Oertel, chairman of the committee, believes that voc-ed as a national need, largely ignored in many present educational structures. "The emphasis today is on sending kids to college," he stated. "Sure, we've got to have the scientists, but we've also got to have people to build the things scientists create. The highly trained industrial worker is as vital to national defense as the rocket researcher." □

The Sterling Silversmiths Guild of America has announced the winners of the 1961, fifth annual Sterling Today Student Design Competition,

awards designed to encourage students to create imaginative sterling silver holloware for today's home. First prize winner of $500 is C. Robert Helms, DeWitt, N. Y., a student at Pratt Institute, whose spherical candle holder (illustrated) features simple lines enhanced by a motif of oval cutouts. □

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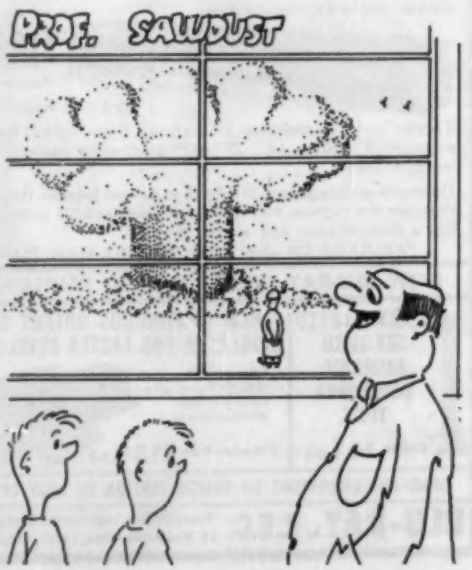

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technical education

The ATEA in Kansas City

Hotel Muehlebach
Kansas City, Missouri

SUNDAY, DECEMBER 3, 1961

3:00–5:00 p.m.

Topic: Meeting of American Technical Education Association Officers, Trustees and Advisory Council

Chairman: J. William Morosi, President, ATEA. Dean, Los Angeles Trade-Technical College, Los Angeles, Calif.

SUNDAY, DECEMBER 3, 1961

8:00 p.m.

Topic: A Look Ahead in Technical Education

Chairman: Walter J. Bartz, Vice-President, ATEA. Chief, Technical Education, State Department of Education, Springfield, Ill.

A. "The Critical Areas of National Defense"

Speaker: Walter M. Arnold, Acting Assistant Commissioner for Vocational Education, and Director, Area Vocational Education Branch, U. S. Office of Education, Washington, D. C.

B. "Expanding Needs in the Health Fields"

Speaker: Laurence L. Jarvie, President, New York City Community College, Brooklyn, N. Y.

Recorder: George B. Rodenheiser, Director, The David Ranken, Jr., School of Mechanical Trades, St. Louis, Mo.

Host: Hollis W. Dahlor, Director, Vocational Education, Kansas City, Mo.

MONDAY, DECEMBER 4, 1961

9:00–11:00 a.m.

Topic: Plans for Expanding Technical Education

Chairman: Roy W. Dugger, State Supervisor, Technical Training Services, Board for Vocational Education, Stillwater, Okla.

A. "State Program Procedures"

Speaker: Donald M. Brill, Supervisor, Vocational Programs, State Board of Vocational and Adult Education, Madison, Wis.

B. "State Professional Technical Organizations"

Speaker: Mary L. Ellis, Executive Secretary, Oklahoma Technical Society, Inc., Stillwater, Okla.

C. "Regional Organizational Patterns"

Speaker: Theodore A. Koschler, Dean, Technical Studies, Dade County Junior College, Miami, Fla.

Recorder: Vernon B. Leirer, Director, Vocational and Industrial Education, East St. Louis, Ill.

Host: Thomas E. Moorefield, Research Associate Work Study Program, Kansas City, Mo.

MONDAY, DECEMBER 4, 1961

11:00 a.m.–12:00 noon

Topic: Business Meeting of American Technical Association

Chairman: J. William Morosi, President ATEA

MONDAY, DECEMBER 4, 1961

12:15–1:30 p.m.

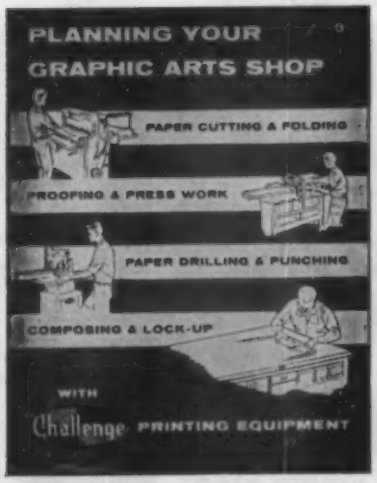
Topic: American Technical Education Association Luncheon Meeting

Chairman: J. William Morosi, President, ATEA

Speaker: Harry Bigelow, Employment Manager, Argonne National Laboratory, Argonne, Ill.

"The Need for Technical Education to Meet State and National Economic Security"

(Concluded on page 49)



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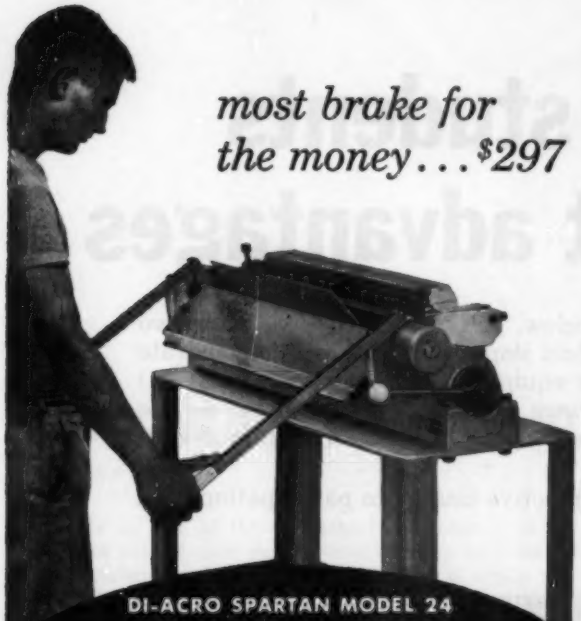

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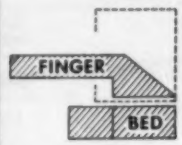

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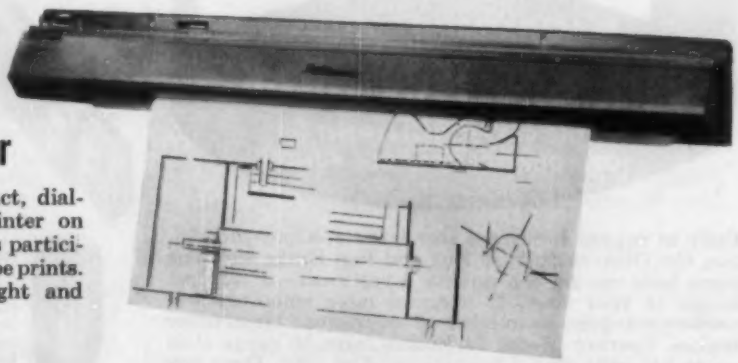

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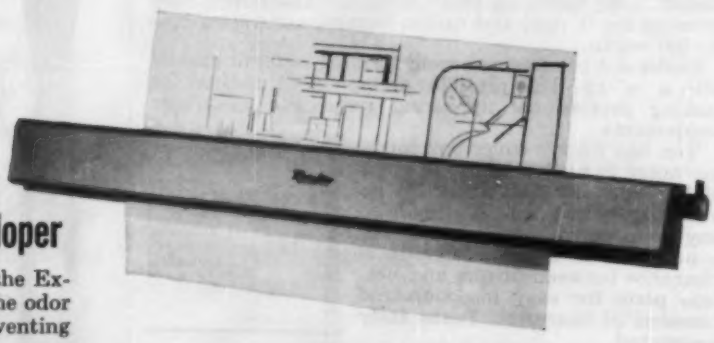

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the editor's stand

IS OUR TEACHER EDUCATION ADEQUATE?

Probably no area of the high school curriculum is as dependent for success upon the character and ability of the individual teacher as industrial arts. Since industrial arts is generally an elective subject in high school, its success in attracting a large percentage of students is due almost entirely to the interest the teacher can develop in this subject. Since the teacher is the product of teacher education, colleges and universities must take the responsibility for the success or failure of industrial arts in the high schools. Is the present teacher-education program for industrial arts adequate? The quality varies greatly among institutions throughout the United States. Some teacher-education departments in industrial arts are strong while others are pitifully weak. All, however, produce industrial arts teachers who are considered adequate to teach.

Some Criticisms

In answering the question of whether or not our teacher-education programs are adequate, we must look at the strengths and weaknesses of our current shop programs. Some of the criticisms often mentioned are:

1. Many teachers lack a sound philosophy of what good industrial arts should be. Too often, the teacher does not know *why* he is teaching the subject. The main concern of far too many teachers is the making of a few projects. While many teachers give "lip service" to some of the important objectives, actual teaching programs often reflect little or no attention to these aims.

2. Many teachers seem willing to get along with limited and make-shift equipment, tools, and materials. If our objectives are sound, the industrial arts teacher should be an expert in design of physical facilities. In many shops, however, it is clearly shown that the teacher is not at all critical of the kinds of benches, cabinets, tools, and machines with which he must work.

3. There is a great lack of appreciation for and use of written instructional materials — including textbooks, references, technical magazines — so essential to a good program.

4. The design of the school shop project is frequently very poor; the teacher is satisfied with the kind of project he is producing without working and studying to upgrade his taste in design.

5. There are too few good general shops in which an adequate offering is available. The general shop is oftentimes a glorified wood shop; there is little or no electricity or metal-working, no power mechanics or graphic arts.

6. There is a lack of uniformity of offerings in industrial arts throughout the United States. If industrial arts is part of general education, the same basic content should be good regardless of the location of the program. Yet we probably find greater variation in industrial arts as to content than in any other school subject. In some areas of the country, industrial arts means woodworking; in others it means arts and crafts; in most it means project making.

7. It is difficult to find good teaching in many school shops. This is particularly true in the general shop. Time after time the teacher is merely "holding shop" or assisting with project making rather than doing any actual teaching.

Suggestions for Improvement

There are other weaknesses that could be mentioned, but it is enough to indicate that all is not well in our industrial arts program. This brings us to a second question of what can be done to improve teacher education in order to heighten the quality of industrial arts in high school. Here are a few suggestions to consider:

1. We should establish minimum standards of education and/or training in each of the basic technical areas. Too many of the teacher-education departments offer no courses at all in such areas as electricity or power mechanics.

2. We should establish a national approach to the certification of industrial arts teachers. Until that time arrives, we will find many weak teachers and many weak programs. The minimum standards for teaching industrial arts in many states are woefully weak.

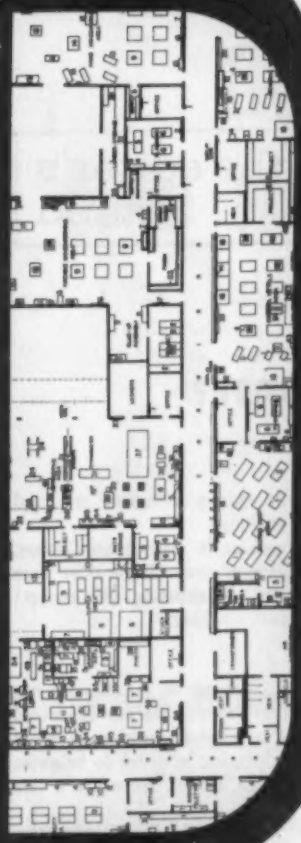
3. We should establish entrance and graduation standards for industrial arts teachers. It might be a good idea to consider national standardized tests in certain professional and technical areas which each teacher must pass before he can qualify as an industrial arts teacher.

4. We should eliminate the teaching minor in industrial arts. No individual with 15 hours of shop work is qualified to teach in a program as complicated and diversified as industrial arts.

5. We should require work experience in industrial areas for all industrial arts teachers. It seems desirable that teachers who are to interpret industry acquire some actual experience.

6. We should promote the establishment of industrial arts co-ordinators and supervisors. One of the best ways to improve the quality of industrial arts in a state or district is to have a well-qualified supervising head. It has been repeatedly suggested that a great deal of improvement in teacher education can be made through self-evaluation. This is probably true in the better and larger schools which have an adequate staff and good physical plant. However, many of the smaller college departments need some outside help and assistance if they are to improve their programs to a point where they can actually produce qualified industrial arts teachers. □

John L. Feirer



lueprint for Industrial Education

M. J. RULEY

In creating a blueprint for industrial education, we must understand that the basis of the industrial education curriculum is modern industry; that the industrial education curriculum has developed over the years with the selection of skills and information adaptable to school shop and drafting rooms from the vast reservoir of modern mechanical and scientific knowledge; that industrial education is an integral part of the school curriculum, rather than a special subject; that efforts are being made to co-ordinate industrial education instruction with other departments of the school.

Courses in industrial arts are an important part of the program of general education in the public schools of our nation. They differ in major purpose and emphasis from those in vocational education. Courses in industrial arts seek to provide experiences which develop an understanding of the materials and processes of industry and at the same time develop general manual skills. Vocational education, on the other hand, aims for the development of occupational competency through specialized education.

Industrial arts courses are included in most all of the public junior and senior high schools of the nation. Such classes offer many opportunities for pupil guidance toward vocational choice along with important understandings, attitudes, and skills needed in personal efficiency and economic citizenship.

The industrial arts and vocational industrial education programs are one aspect of the total program through which the public schools are prepared and ready to do an effective job of helping young people to become contributing citizens of their community.

Since well over 50 per cent of all workers in the United States are employed in some phase of industry, it seems imperative that the schools assume a progressive attitude toward industrial enlightenment. "If, as has been pointed out, an important purpose of general education relates to the transmission of the social culture, then the vital place which industry holds in the American way of life should certainly call for major emphasis upon these phases of the program that deal with its exemplification in the schools."

Role of Teachers-Administrators

The classroom teacher has a very special place in the industrial education program. He usually has more personal contact with the student than any other person in the school system. He observes students in many situations and can be a valuable aid to the counselor or other guidance personnel in his awareness of potential trouble. He is the first to know when a student becomes moody, belligerent, or displays other symptoms of anti-social nature. The teacher can locate the over or under achiever, as well as other indications of emotional insecurity. These may be refered to the counselor, who has developed a special competency in this area of education.

Industrial education, like other areas of the school program, must have the approval and active support of the superintendent. He must recognize the need of a comprehensive program and be imbued with the over-all education philosophy. He must use his role as the educational leader of the school and community to convince the board of education of the need and desirability of this phase of the educational program. In turn the supervisors of such

□□□ *According to Webster, a blueprint is a "co-ordinated program of action." Here is a summary of basic components of industrial education, developed to enable the programmer on the local school district level to key together the elements into an effective pattern.*

an area must have convinced the superintendent.

Objectives of Industrial Arts

In answer to the question, "What objectives should be emphasized in industrial arts?" the following four were selected and presented by Dr. Hostetler at the U. S. Office of Education "Conference on Industrial Arts," June, 1960:

"1. To develop in each student an insight and understanding of industry and its place in our culture.

"2. To discover and develop talents of students in the technical fields and applied sciences.

"3. To develop technical problem-solving skills related to materials and processes.

"4. To develop in each student a measure of skill in the use of the common tools and machines.

While these four are considered basic for industrial arts as a whole, supplementary objectives should be developed for the various age and grade levels — elementary, junior high school, senior high school and adult programs. Supplementary objectives should also be considered for the gifted and the slower learner.

Manipulative skills are important but only as they are used in achieving the major goals of industrial arts education."

Industrial arts is an area in the school curriculum that can demonstrate opportunities for high-level creativity, problem solving, and a study of the vast technology of our industrial culture. Careful consideration should be given to upgrading course content and teaching methodology; industrial arts can then take its rightful place with other challenging secondary school studies.

Mr. Ruley is supervisor of industrial arts and vocational education, Tulsa, Okla., schools.

The industrial arts laboratory stands unique as one of the few facilities and situations in which all education can be brought together and synthesized. Functional industrial arts and teaching will exploit this uniqueness and extend its benefits to all ages and levels of learning. Emphasize those things which industrial arts makes specific contributions to the education of youth.

Industrial arts has the subject matter and activities to challenge the more able student. Attention should be given to the establishment of special high-level industrial arts classes that will attract pupils interested in science and engineering and where they can put into practice the principles of many areas.

A minimum program for the more able, average, and less able needs to be established. This minimum program should be geared to the "Imperative Needs of Youth" (junior and senior high school), characteristics of youth, and the present day technology in which we live.

If we believe in the philosophy of the junior high school, industrial arts has a definite place in providing offerings in basic areas of industry.

At grades 7, 8, and 9, boys should have the opportunity to receive instruction in multiple activity shops. (The first opportunity for practical arts instruction in most schools.) The instructional program should be designed to encompass a variety of beginning experiences with the common tools, materials, processes, and problems of industry.

Dr. Conant, in his report "Education For the Junior High School Years," says "Instruction for all boys and girls in art, music, and physical education; instruction for all girls in home economics and for all boys in industrial arts. In areas where school drop-outs are high, the latter two departments have a responsibility to start the development of vocational skills."

Areas of Instruction

The areas of instruction should include basic exploratory experiences in drawing and planning, woodworking, metalworking, electricity, graphic arts, power mechanics and industrial crafts (others may be added). The program should include at least nine weeks in each of the exploratory areas, for at least one and one-half years, allowing nine weeks in each of six areas. Further instruction (one-half year in the eighth grade, and one year in the ninth) to be elective in basic areas or in others not listed. The elective program to be scheduled for one semester in a single phase of industrial arts as previously experienced in basic exploratory areas. Such a program to be carried on if in a one-teacher or multiple-teacher program.

Grades 10, 11, and 12 should be maintained in shops, laboratories, or drafting rooms especially designed and equipped. Where possible, courses should be limited to a single phase of industry which will meet the needs of students with varying abilities, aptitudes, desires, and interests. Each course should be designed to extend for at least one regular school year (36 weeks — minimum of five periods per week). In some areas a double period should be used. It is here that some of our offerings need to be upgraded to meet the needs of students and present day technology.

Offerings in industrial arts for the average student should be of the type we now have, with upgrading and better correlation with other subjects. Many practical applications of science, mathematics, art, language arts and other subjects may be given meaning and thereby enhance instruction in industrial arts as well as other subjects.

A suggested time allocation should be made for so called direct and indirect related instruction. With its physical setting and ability to make certain unique contributions to the education of youth which few other subjects can make, industrial arts must never lose its uniqueness and become just another theory course.

In most cases students, who take multiple-activity type industrial arts in the junior high school, do not have enough time in each area to develop any degree of skill or technical knowledge. For this reason, one year of a basic industrial arts subject is needed at the senior high school level. If the student did not have the opportunity to take industrial arts in the junior high school,

he or she has missed the various experiences in a variety of areas of industry and must make a selection at the high school level without previous exploratory experiences.

After a basic one-year course, more able students should be ready to do intensive research and planning, using new materials and processes, and modern machines and tools that will give them an opportunity to do advanced work of an industrial nature.

One of the future areas, with the noncollege or college bound student, could be *specific* training in some area so a student will have something specific to sell. Industrial arts will reach ten students to one that vocational (reimbursed) classes will reach. All education is geared to a vocational or occupational choice in preparation for making a living.

Classes for the below average student have been and will continue to be a problem the same as for the above average student. Such courses might be classed as special education and much needs to be done in this area. Industrial arts will be called upon to assume a heavier responsibility for the education of nonacademic youth.

Vocational-Industrial Education

Vocational-industrial education in the public schools is that part of public education which is devoted to the purpose of providing opportunities for high school age youth, in preparation for entrance into useful employment in the various trades and industrial occupations in the state.

It is not merely preparation for specific skills in job competency, but also the knowledge and training that will contribute to a satisfying and productive life of employment. It develops skills, abilities, understandings, attitudes, working habits, and appreciations, and in addition helps individuals gain a knowledge and information needed by workers to enter and make progress in employment on a useful and productive basis.

The goal of vocational education is the competent worker — competent economically, socially, emotionally, physically, and in a civic sense.

The vocational program of the public schools includes essential general education, and those types of vocational instruction which can be more effectively and more economically achieved by the schools than by other agencies. The public schools share responsibility for vocational education with the home, the community, business, labor, industry, and other agencies.

Much occupational and technical training is provided by industry and business, but there are many fields of employment for which vocational education can and should be provided by the schools. These broad occupational fields include a variety of skilled jobs in the service, distributive and office occupations, in agriculture, and in trade and industrial occupations.

Vocational courses are offered to adults already working in their vocation and who wish to prepare themselves for advancement through the adult evening programs.

Thirteenth and fourteenth year (Junior and Community College) experimental laboratories, shops, and drafting rooms offering practical work in industrial arts, vocational-industrial, and technical education relating to industry and technology, should find many enrollees. Here again, such courses can and will be specific and give meaning to one's future employment.

Classes now offered and those proposed would meet the needs of most adults. As more time is available for supplemental instruction, hobbies, interests and leisure time activities, the adult education program, including industrial education, will increase. Adult courses should offer basic training if the adult student has no basic skill or knowledge. Flexibility should be the keynote for all adult classes. Home workshops for every home should be the goal of all industrial arts teachers.

Science and I-E

Industrial arts' greatest contribution to accelerated scientific education can be made through our offerings in electricity — electronics, drafting, power mechanics, metalworking, etc.

As one views exhibits at school science fairs, it will be found that a great many of the models have been built, or partially built, in the industrial education shop or laboratory, or with the help of the industrial education teacher. Industrial education should not become a science or mathematics course, nor should it lose its identity as a subject that interprets and prepares for industry, but it can and should make a substantial contribution in other fields.

Teacher Preparation

At the present time many of our teachers do not have the background to do some of the things proposed. Added courses on the graduate level work in industry or in-service study must be obtained by the teacher to keep up to date with the changing technology.

Experience in a payroll job of industry should be recognized the same as college requirements, in fact, such a requirement for a master teacher would not be out of line. This is the only way many schools have been able to secure teachers or qualify them for such accelerated courses.

Excerpts from an article with pictures carried in the Sunday Tulsa World of October 3, 1960 are as follows:

The excellence of any school system can be measured by professional ability of the instructors. And in Tulsa this ability is continually being furthered through intensive "in-service" programs.

Take, for example, the work being done by 10 junior high instructors in the field of industrial arts. They will spend 12 weeks on projects designed to help them teach electricity to seventh graders enrolled in industrial arts courses. For the teacher it means two extra hours of work every Tuesday — work for which they receive no pay.

"The idea of the in-service project," explains M. J. Ruley, supervisor of industrial arts and vocational education, "is to upgrade work of longtime teachers and to help those new in the system. It also is designed to develop teaching guides which can be used by others teaching the nine week course in exploratory electricity."

The in-service period gives teachers time to develop their own experiments and projects which can be used later in classroom teaching.

Work in electricity is part of a year-and-a-half required program involving learning about woodworking, metalwork, printing, handicrafts, drawing, and planning.

All departments in the Tulsa system operate such in-service programs, Ruley stressed. It is another way in which teachers get caught up on "what's new" in their professional areas.

Basic courses for college bound students planning to become engineers, technicians, or industrial education teachers should be and are being developed for this group of students.

Courses in descriptive geometry, preengineering drawing, basic electronics, materials and processes, and others, will help the student to bypass college courses, be granted credit, and in many cases allow him to have experiences in a shop or laboratory that will be of value in engineering and science courses. Most engineering schools do not require engineering shop work because of time and added theory courses for graduation.

Most colleges will recommend that students take such courses while in high school. Such a statement should be in all guidance handbooks.

Accelerated courses are specific for a certain group, but no more than for the below average. Advanced courses in mathematics, science, and foreign language are of the same type — meeting a specific need. □

A County-Wide Vocational School for a Rural Area

CHARLES O. DAVIS, JR.

□□□ *A report on a small city's night vocational school project, organized on a county basis to serve the adult education needs of the surrounding rural area.*

A small-town adult vocational education project, originally Chamber of Commerce sponsored, has blossomed into a 23-course curriculum and one of Wisconsin's largest night vocational schools. It has moved out of its hometown to become a county-wide project, and the response has been gratifying.

Organized in 1947 in New Lisbon, Wis., by the Chamber of Commerce as a limited trade school, the institution became the New Lisbon Vocational school in a few years and gradually grew until it had an enrollment in the 1959–60 year of about 600.

Practically the entire curriculum was organized around such vocational standbys as welding, pattern layout, machinist training, sheet-metal work, etc. Homemaking classes in sewing and tailoring were introduced to appeal to women.

With the approach of the 1960–61 year, however, the school decided to go county-wide, and the move has doubled enrollment. In the first semester alone, it was 605, and the second semester is almost as high. The school is now operating five nights a week in five different communities around the county, utilizing a dozen or more buildings and empty offices.

The size and popularity of this school have important meanings for vocational educators everywhere. For one thing, it shows that the desire for adult education is universal.

The New Lisbon school is in the heart of a rural area, in a county with a total population of only 17,500, where farming is still the chief business. There are only a handful of industries in the county, and all of them small. Most people who do not live on farms make their living in small shops and stores or in the tourist trade.

Mr. Davis lives in Mauston, Wis.

Need for Voc-Ed

Yet there is evidently just as much hunger here for vocational training as there is in a city. Many of the men studying welding are farmers, and never expect to be welders by trade. The women studying sewing are homemakers here to learn how to do something better. Those studying cabinetmaking and leathercraft and upholstery are usually doing it to learn a hobby or a craft to enrich their lives.

Another interesting fact turned up here is the popularity of the so-called "soft" subjects, not strictly vocational in the usual sense of the word.

While welding and sewing and upholstering and pattern layout are among the most popular classes, there are large numbers of people turning out for classes in contract bridge, conversational French, Spanish, Latin, first aid, driver education, and investments. A class in art began with the second semester; new classes are being organized in public speaking and small business operation.

The Curriculum

Under the direction of the Wisconsin Board of Vocational and Adult Education, the New Lisbon curriculum is divided into six sections. One of these, distributive education, is not being used at present.

Under trade and extension work, the school offers welding, machining, pattern layout, blueprint reading, fire fighting, auto body, auto mechanics, and cabinetmaking.

General education classes include electricity and electronics, languages, first aid, driver education, investments and securities, and public speaking. The business education subdivision includes typing, bookkeeping, shorthand and accounting.

A section termed "avocational" work covers upholstery, leathercraft, and contract bridge. These courses do not qualify for state monetary aids, although all other courses do. The final section is labeled homemaking, and includes classes in sewing and tailoring.

The school's "faculty" at present is composed of about 35 persons. Most of them are high school faculty members, but a large number are drawn from other walks of life. Thus the teachers of welding and pattern layout are employees of welding and steel fabricating shops. The upholstery instructor is a local furniture dealer and upholsterer. The French teacher is a Belgian war bride. Some of the instructors are former teachers who have become housewives and left the ranks, but welcome an opportunity to return.

The Budget

The 1960–61 school is operating on a budget of approximately $12,500, with salaries being the largest item of expense. The payroll was almost $9,000. Other items of expense include clerical and administrative costs, building rental, equipment, etc.

By the end of the 1960–61 school year more than a thousand adults of the county will have enrolled in the vocational school. The obvious enthusiasm and the evident desire for a wide variety of courses, have been an eye opener in communities which for years have had to look to metropolitan centers for adult education. □

It works! Students in New Lisbon's electricity-electronics program evince their high interest by traveling 40 miles to attend weekly classes.

Should Organizational Patterns

□□□ *The second in a series of "forum," in which leaders in industrial arts discuss a vital issue — as a sounding board for your own views on the subject.*

Write down your ideas on the "organizational patterns for industrial arts" and send them to The Editor, IA/VE, 400 N. Broadway, Milwaukee 1, Wis. (As many as possible will be published in forthcoming issues.)

Baird

Boyd

at the round table

Randels

"The problem solving approach combined with unit activity organization would certainly bring us closer . . . to our goals."

Our present concept of the place of industrial arts in the public school requires many changes in our organizational patterns. Since industrial arts can and should be little more than a phase of the total educational background of our young people, it is necessary that we organize our content around those things that will be most meaningful to development. That is, the student should have an opportunity to become acquainted with our democratic industrial society, our natural resources, materials and processes of industry, and to exercise his manipulative development through the use of tools and machines. Our past and present organizational patterns have undoubtedly placed more emphasis upon the latter, though it is no more important than any of the others. A glance at the majority of our textbooks illustrates this point. The student is confronted with a series of descriptions of tools and materials in a particular area which proceeds through the many processes in the construction of a project seldom related to a similar industrial application.

It may be true that the foregoing pattern for the organization of content provides for an understanding of how one man might make something out of given materials and tools. However, our social and industrial society, relies little upon the abilities of one man to produce such an item. It is upon this analysis of our present organizational patterns that new insights to organization must emerge.

First of all, our rapidly changing technology and varied use of materials provide an incentive and need for organizational change. In our more traditional patterns of organization it has been difficult to keep up with changing and advancing industrial practice. It is difficult to provide experiences in such activities as automation, experimentation, mass production, or creativity in the traditional setting. Our organization should be based on unit activities which provide the student with an opportunity to learn about industry and our industrial economy rather than just the experience of making things.

An example of this type of organization might be a unit activity in mass production as a phase of a course in woodworking. During the process of participating in such a unit the student not only has the opportunity to plan and make a project, but he also becomes involved with and gains an understanding about problems of management, labor, production, sales, and many more. Certainly he will develop skills, for he will be manipulatively involved in the production, but he will also have a chance to study the many other aspects of modern industry at the same time.

The second change in organizational patterns that should be emphasized is that content should be selected on the basis that it establishes meaningful problem solving situations. Our past is cluttered with pet problems and projects that require the student to do little thinking on his own. He simply follows instructions and operations to gain satisfactory results. However, when students are confronted with meaningful problems where answers are not known and a direct line of attack is not clear, the many ramifications of learning come into play. He must investigate, create, experiment, research, and construct in order to develop a satisfactory solution to his problem. The atmosphere for learning has emerged.

At any level in industrial arts the problem solving approach combined with unit activity organization would certainly bring us closer to the realization of our goals. □

RONALD J. BAIRD
Assistant Professor
Industrial Arts Teacher Education
Ohio University at Athens

"Let's come to our senses and start improving the industrial arts curriculum we have developed over the years!"

The answer to this question as I see it is a qualified "yes." But I do not agree with many of the changes being

for Industrial Arts Change?

promoted by some educators in our field. Our leaders in industrial arts have laid down a very sound foundation for our program. They have prepared a set of objectives which apply as well today as they did when they were written. To meet these objectives change is certainly a necessity as new materials, tools, and processes are developed.

Changes in our organizational patterns, however, should not be made until thorough research aimed at improving industrial arts has been made. This brings up a point which is very disturbing to one who is proud of the offerings of our program. Some of our industrial educators seem to feel that industrial arts is not respectable or at least this is indicated by some of the proposed courses. They seem to think that the values of our program which have gained for us the status we now hold no longer meet the needs of today's education. There has been a tendency by some industrial arts teachers recently to concentrate on objectives common to other subjects. We have plenty to teach in our courses without changing to some of the science, math, and social studies courses being proposed by these people under the disguise of industrial arts. True, we must develop an understanding of the applications as they pertain to our work but we do not have time to teach these subjects which are getting excellent coverage in our schools. Science teachers are having their students experiment and work on research problems that some people advocate teaching in our program. School board members, administrators, and the taxpaying public certainly are not going to allow a duplication of courses. These industrial arts teachers also want to discard the project and eliminate the teaching of skills. Skill in the use of materials and tools has been important to man down through the ages. As we study history we find that the advancement in the social culture of each civilization is judged by the design and craftsmanship of their artifacts. We know the importance of skill in the world today. The increase of automation is requiring more highly skilled people to design, build, operate, and service these machines. Before we delete any of our generally accepted objectives, there should be valid studies disproving their worth.

Let's come to our senses and start improving the sound industrial arts curriculum which has been developed over the years! A good industrial arts program makes some very distinct and unique contributions toward the education of youth which are not provided by any other subject in the school curriculum. Then why not use these objectives as guide posts and develop our courses accordingly? We should all pull together to strengthen and improve our present organizational patterns and make the necessary changes needed to bring our courses up to date. For example, woodworking in too many schools is so outmoded that many people are suggesting that we drop it entirely. This is due largely to the fact that we have not kept pace with the technological advances made by the woodworking industries. We need to strengthen our high school industrial arts program and give our courses more depth and breadth at this level. These courses should be developed so they will reflect our changing technology more accurately. The content should provide an opportunity for student activity which will develop skills and require the solving of technical problems by working with new materials, new processes, and new machines.

To me this does not indicate any radical change in our organizational pattern. Our objectives are sound. We have plenty of important content of our own to teach. We must do more research with the interest of industrial arts in mind and make any changes found in these studies which will improve our program. Our energies must be spent toward keeping in close contact with the industrial and technical world, bringing our courses up to date, and doing a better job of teaching. □

GARDNER BOYD
Director, Industrial Arts
Kansas City, Mo., Schools

"... Should follow that of an industrial organization procedure from the design through the development and the production of a new product."

As we discuss change we must keep in mind that skills grow obsolete, and facts change. These may be illustrated by looking at the highly skilled aircraft propeller mechanic in relation to the jet aircraft; it was a fact that man had not been able to venture into outer space, this fact has now been changed.

A look at the way industrial arts has been defined reveals that it is a subject area dealing with the understanding and interpretation of industiral activity. Industrial arts is also considered to be a part of general education concerned with the materials, processes, and products of industry.

With this definition of industrial arts in mind we must today recognize the growing complexity of industrial organization and the explosive pace of the industrial technological and social changes. These are creating an enormous demand on our people that is without historical precedent. Society has always needed a few men with highly developed and disciplined intellects and our industrial society needs masses of literate but not necessarily intellectual men.

The industrial technical automated society of tomorrow will require something that the world has never seen; namely, masses of highly educated intellectuals.

We can no longer express the need for educated men in terms of specific skills. Educationally this is the wrong way to approach the problem because it is impossible to predict today what skills will be needed a few years from now. This is more true when we observe a group of seventh- and eighth-grade students who are enrolled in today's industrial arts class and then try to predict the employment opportunities for these students when they enter the labor market six to ten years from now.

Nothing could be more widely impractical to the future of an individual or of society than an education designed to prepare people for specific vocations and professions to facilitate their adjustment to the world as it is today. To be practical, an education must prepare a man for work that does not yet exist and whose nature cannot be imagined.

The preparation or education of men for living and working in the industrial technical society of tomorrow can be done only by *teaching people how to learn*. This may be accomplished by giving them the kind of an intellectual discipline and the depth of understanding that will enable them to apply man's accumulated knowledge to new conditions as they arise.

This suggests that education at the junior and senior high school level should follow that of an industrial organization procedure from the design through the development and the production of a new product. The industrial arts class problem or lesson may be defined as the design and the development of a manufactured product. This will require the engineering development in keeping with the ability of the students, a model for testing the solution to a problem, redrawing the plans for production, the development of jigs and fixtures necessary for production, selection of tools and equipment, and securing the supplies and materials to carry out the production cycle.

In the process of solving this production problem the class will be required to gain a knowledge and experience of basic industrial arts areas such as metals for tools and supplies, electricity for power, drafting and design for production, graphic arts for production records, woods as may be required for production, transportation for necessary supplies and distribution of product.

Following the production cycle there will be a class discussion evaluation of the solution to the problem. The group of students from this experience should develop a desirable attitude of accepting a problem, how to find the solution to the problem, and develop a realistic approach to taking the accumulated knowledge from reference materials and applying it to the new conditions to test the application of this knowledge to this new situation.

Industrial arts instruction must change from the present day practice to the fulfillment of its major function, understanding and interpretation of the industrial process of production. The direct experience of solving simple problems similar to the complex problems that are involved in industrial production should be a more realistic approach to teaching industrial arts for the future. □

JOHN O. CONAWAY
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Indiana State Teachers College
Terre Haute

"Let us keep the industrial arts . . . concerned with the creation of high quality, three-dimensional objects . . . in common materials using basic processes."

If one will look hard and long at the collection of nonvocational school workshops which are rather loosely joined together under the title of industrial arts and seek to find the factor which is common to all, the project has had an unbroken tradition of dominance through one name change (manual arts to industrial arts) and through the introduction of a multitude of applied arts and sciences (even when the project was not even adaptable to the effective initial learning in the activity, i.e., electricity). Its introduction in the manual training period of school shop evolution is probably the only significant development ever made in the field. (King Project — a piece of fine furniture, an industrial arts awards winner, a thing of shame to be hidden and forgotten in a junior high school locker, or a series of trinkets which are mute evidence of having "been through" the nine areas of the local general shop.) Bless the day, if it ever existed, when everyone agreed that the primary objective of all school shop activity was a production of superbly designed, exquisitely crafted projects in all the mediums — wood, metals, ceramics, plastics, fibers and leather, etc. — and in all the creative processes — such as photography and printing, etc. The day, when each boy in every shop of the land was granted the time, the energy, and the direction to produce a three-dimensional object that was the full expression of all his creative impulses, a thing of beauty and utility, a thing of pride, a thing of peer and parental elation. Murphy stresses the implications of such an utopian condition as "the first great phase in the evolution of the creator appears to be extreme sensitiveness to a specific form of experience, usually sensory; it is especially likely to involve sight, sound, or the muscle sense. It embodies delight in these experiences, a need for more of them, a curiosity into their relationships . . . in other words we are dealing with sensory and activity drives."[1] There is much to be gained by organizing school shop work around the project.

Unfortunately, some of the activities which are called industrial arts do not lend themselves to initial creation via the project. This group of activities can be loosely defined as those in which the component parts or the totality have characteristics involving movement or dynamics. In this manner, a piece of wood or metal is said to be static and can be described by certain static measurements such as length, density, and porosity, etc.; a resistor, while having a full component of static characteristics, has in addition a series of electrical characteristics. A necklace made of bits of wood can be quite aesthetic; a necklace made of resistors is a decadent perversion of their true function. Learning to create in dynamics is relatively complex. If statics are best taught through the sub-project or exercise, the final goal in both cases shall be the project. In dynamics, the Williamson-type audio amplifier, the go-cart, or the dividing head are typical projects. In view of the increasing importance of dynamics in our culture it would seem that this trend should be reflected in the school workshop.

Much has been written of late about introducing into the curriculum certain aspects of engineering — strength of materials, durability, etc. — which is all very fine. Since I do not think, however, that this is industrial arts, let me propose the name "engineering science" for the subject and suggest that teachers presenting this type of material adopt the title. I see no reason why they could not teach this in their industrial arts shop — in addition to their regular work. For those in the industrial arts group who are interested in introducing certain management techniques — time and motion study, cost accounting, and Gailbreth- and Taylor-type industrial efficiencies — let me again suggest a new name, "industrial management." Again the industrial arts shop is an excellent place to present the course with industrial arts teachers acting as instructors. If both of these suggestions are implemented, imagine the increased demand for industrial arts personnel.

In conclusion, let me urge that from this time on all traces of the terms unit, general unit, and general, in reference to school work shops, be eliminated from the literature. Let us just say that industrial arts is concerned with the intelligent creation of three-dimensional objects from any material using any process. This statement should by no means imply that all materials and all processes must be used and studied. Industrial arts as a school subject would be similar to social studies, science, or mathematics. How silly it would be if every mathematics teacher felt the Boolean Algebra or Non-Euclidian Geometry should be included in his ninth grade mathematics course, if the social studies teachers should feel that the Turner thesis or the Feedback theory of American emigration must be included in every course, or if even the fired-up science teacher of our day, would consider Cryology, Cosmology, or Histology as essentials. Yet each is a legitimate field of study on the graduate level. Industrial arts, while including an almost unlimited number of materials and processes, must be sharply abstracted when presented to young people. Elements from a maxi-

(Concluded on page 44)

[1] Murphy, Gardner, *Personality* (New York: Harpers, 1947), p. 453.

How to Improve the Teaching-Learning Environment in I-E Classes

HOMER C. ROSE

□□□ *Another in the series of "how-to" articles on more effective teaching practices, this one considers better ways to provide for the physical condition of the classroom or laboratory, the maintenance and arrangement of its equipment and material.*

My first industrial arts teaching job was in a small town. The school board had already indicated its intention to abandon the industrial arts program and the superintendent gave the department one more year of life. It was not difficult to understand why. There was not a single sharp tool in the shop. Bench vises did not hold. Bench tops were marred and dirty with grease, glue, and paint. The metal working area was located within the drafting area. Lighting was bad. There was no place to store the few materials on hand. Prices charged for cabinet lumber were 300 per cent over cost. Needless to say, there was no course of study.

After being on the job a few weeks I found many useful tools, including a full set of sheet metal equipment stored in the attic of the building. I was told by a boy on the street that the instructor had placed them there because he did not wish to be asked embarrassing questions about their use. The boy had quit school. Today he is a successful building contractor — but has no use for industrial arts. Although this situation is certainly unusual, at least in degree it is not exaggerated.

It is always easy to understand why good students in some localities look upon industrial arts as not worthy of their time; administrators consider it a dumping ground and the community has no concept of the potential value of industrial arts education for all students. This article deals with one reason why.

The Physical Environment

The physical condition of the classroom, shop, and laboratory has a strong effect on the amount and the quality of learning. Well-planned and well-managed facilities tend to develop good student attitudes, without which effective and creative learning is impossible. Dirty disorganized surroundings have a negative effect on education.

How can an instructor take pride in his home and other possessions, but neglect his place of work? If this is an indication of attitude toward the teaching job, it is a serious problem.

Here are a few suggestions[1] for improving the classroom and the creative arts shops as an essential step toward a sound training program.

[1] For more information, *The Instructor and His Job*, Homer C. Rose, American Technical Society, Chicago, Ill.

Cleanliness, Color, Light, and Sound

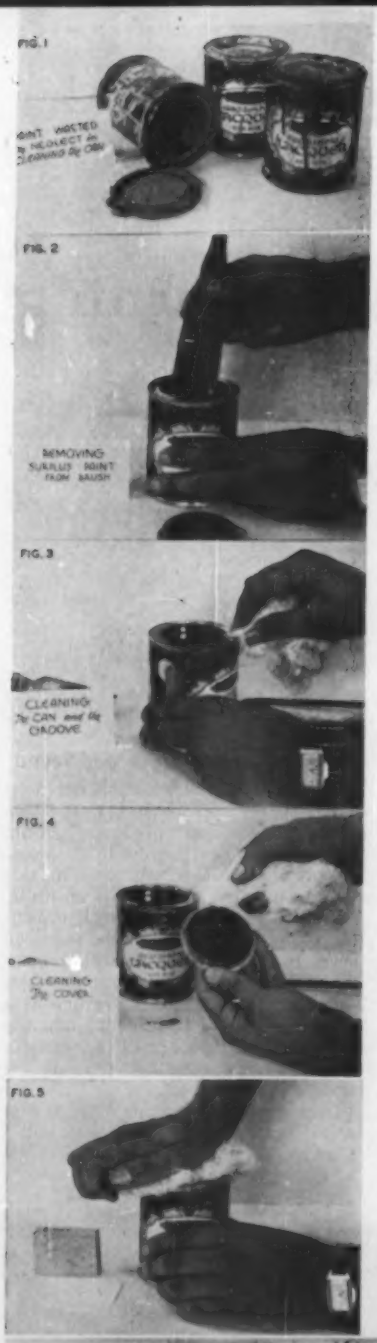
I recently visited an industrial shop in the agency for which I work. This woodworking shop produces special types of equipment for use in the training program. All power tools in this shop are painted a semi-gloss off-white.

My first reaction was to wonder about the appropriateness of white paint on power tools. After talking with a number of the workers and with the shop foreman, a man of great prestige as a craftsman, I have little doubt that the choice of color has had a desirable effect. Every worker took pride in the condition of the shop.

I am not suggesting this as an answer to all shop painting problems, but I do suggest that we can create a differ-

A well-organized, well-managed laboratory (of the Federal Aviation Agency) that combines classroom facilities, test equipment, and related training aids.

Dr. Rose is chief, training standard, and development staff, Federal Aviation Agency, Washington, D. C.



ent atmosphere by the use of color and design.

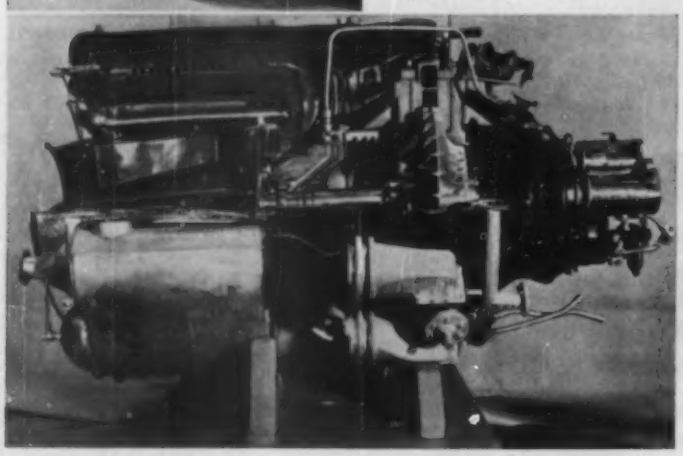
It is recommended that: (1) the ceiling and walls be painted a modern light color; (2) all power machinery be painted one appropriate color; (3) power switches be red; (4) operating controls be yellow, and (5) consideration be given to the use of painted lines on the floor to mark off safety zones around power equipment.

The appearance of the shop as a whole is important. The only suggestion here is to stand back and look at the total room as one would see it for the first time. Merely moving a bandsaw from the center of the room to one wall may improve the entire vista of the room.

Wherever practicable acoustical materials should be used on the ceiling of shops and other methods of reducing noise should be attempted. Some equipment can be mounted on pads which tend to deaden the sound. Metal bench tops may be covered with wood or other less noise-producing materials.

Below: A good poster (taken from the author's The Instructor and His Job, *American Technical Society, Chicago, Ill.).*

Left: A bulletin board illustration helps to teach simple procedures. Below: A model should be on display when needed.



I believe that each boy should clean his bench and tools at the end of each period. Wherever possible janitor service should be used for "end-of-the-day" cleaning of the room.

Modern dust collecting equipment is almost a requirement for the woodworking area.

An industrial arts shop should be spotless when not in use.

Anyone who has done careful work with three-dimensional materials of any kind knows how difficult it is to see what one is doing. Adequate overhead lighting should of course be provided but it may also be desirable to provide locally controlled special lights which are needed for each type of work being pursued. For example, band saws should have small spotlights focused on the blade where the cutting line can be seen. From 30 to 50 foot-candles are required for good shopwork. Fluorescent lighting is most desirable because it reduces shadows.

Maintenance of Shop and Equipment

This is always a problem, as few instructors have outside help, yet industrial arts equipment must perform perfectly if our objectives are to be reached. I believe that every instructor should have training in the maintenance of both hand and power equipment. Also, it seems that the teaching of maintenance is inherently a part of most courses and that students should receive enough training to assist at least in maintaining the tools they use. I am not, of course, suggesting that seventh graders be given a semester of saw filing. Periodically certain tools may be sent to be resharpened by the factory. Nevertheless, each student should maintain his tools to the extent consistent with his level of training.

I believe this has a favorable effect on the attitude of students, parents, and community and that the department with a reputation for taking pride in the condition of its equipment is in a relatively good position with regard to obtaining new and additional equipment when it is needed.

Another concept is closely related to the above. I have known instructors who never practice in their field. For example, I have visited the homes of woodworking instructors which contain not a single item not purchased commercially. We can all readily agree that the level of skill produced in college teacher training programs cannot be very high. There are too many other important things in the curriculum. It follows then that the instructor must develop his skill by self-improvement. This, of course, includes reading, research, and experimentation in new methods and materials and with new designs.

I found that my own work on "outside-of-class" projects increased my competency and my interest in the subject. If I were to sign up for an industrial education course today, I would

like to know that my instructor is still trying to improve himself in the subject he is teaching.

Another by-product of instructor-built projects is that by this process the instructor frequently finds a better way of organizing the layout of the shop and the storage of equipment. It may help him to keep a learner's point of view — so essential in a teacher.

Arrangement of Tools and Equipment

Any list of criteria for the arrangement of tools and equipment should include: (1) frequently needed tools available at work station; (2) other tools placed to reduce traffic within the shop; (3) no waiting in line to obtain tools or check them back; (4) easy visual method of identifying the presence of all tools; and (5) attractive arrangement which suggests craftsmanship.

I remember old Jones. He lost more tools and spent more time justifying new purchase orders than any other man in the department. He carried many of the smaller tools in his pockets — his theory being he could control them better that way. All other tools were behind bars and grudgingly passed out by a frustrated student assigned the task — not infrequently as punishment. Cooperation with the instructor and between students was practically nonexistent.

In contrast was another shop in the same system. This was characterized at first sight by its carefully designed tool panels. These displayed the tools in an attractive manner which made them easily available and helped to identify misplaced tools at a glance. At the end of each period each panel was checked by a student who simply pressed a button to indicate on an enunciator system that his panel contained all tools in proper order. The enunciator was installed by the eighth grade boys and completed as a class project. As students profited by the availability of proper tools, co-operation with the instructor was very good and tools were rarely misplaced. The instructor had the philosophy that good tools placed attractively on panels helped to develop good attitudes — a necessary ingredient in good craftsmanship.

Storage of Materials

The storage of materials in multiple activity shops is no simple problem. It deserves good management effort in order to increase efficiency and economy in the use of materials and to assure student safety.

Long materials such as lumber and metal strips can be placed on racks which permit their removal sideways rather than by pulling them their full length.

Short stock racks can be designed in the vertical position. These cause short material to "feed down" and to be used first.

Sheet metal can be dangerous if stored in a "leaning against the wall" fashion. Frequently a supply of sheet metal can be stored in a desirable manner on flat shelves under the sheet metal table.

Books and Other Instructional Materials

In this category we would include text books, instruction sheets, blueprints, photographs, design scrapbooks, and any other graphic or written material used by the student as part of the course of study. The number one requirement is, of course, that materials consistent with the course of study and helpful in meeting its objectives be obtained. This involves a constant effort on the part of the instructor to identify, purchase, or in some cases produce or duplicate a variety of instructional materials.

The second requirement is one of availability. The materials must be in reach of the student when he needs them. While certain materials are usable through normal library sources, the bulk of materials should be available within the shop or laboratory area. If we are to take care of individual differences in a direct manner, the instructor should be able to have needed material in hand on a moment's notice.

As with tools, good management of instructional materials is a matter of understanding and co-operation between student and instructor. Students who find instructional materials in good shape and readily available will tend to respond by taking care of the materials and using them properly. Certainly some rules and regulations are needed, but it is more important to wear out instructional materials through useful activity than to have them deteriorate on the shelf for display purposes only.

A variety of methods can be used to prolong the life of instructional materials. Books can have protective covers; blueprints and photographs can be covered with cellophane. Much used drawings and instruction sheets can be mounted on cardboard or other panels. Illustrations clipped from periodicals which vary greatly in size can be mounted on standard-sized sheets to facilitate filing and projection through the opaque projector.

It is a good idea to have at least one copy of all commonly used materials under lock and key to facilitate replacement of materials worn out in use.

Shop instructors frequently complain about the problems of duplicating materials. Several very fine duplicating machines have come on the market recently and it is not possible to make excellent copies in a few seconds. At least one such machine should be available to the department and adequate copies of materials made available to the students at all times.

In my own experience I found it possible to work out co-operative arrangements with both the commercial department and the print shop by which my classes were able to provide some service to them in return for typing and printing. This relationship, when kept in perspective and not abused, can be productive in terms of better interdepartment understanding and support.

Obtaining and Using Training Aids

Here we include all types of projection equipment, displays, models, charts, and chalk boards. Industrial arts teachers have been pioneers in the development and use of certain types of training aids. They have traditionally used illustrated instruction sheets, and models and displays which have been very effective. Occasionally these good training aids are less effective than they can be because of poor management.

If we assume that the instructor is able to procure the necessary training aids and equipment there are certain guidelines he can follow with regard to storage, operation, and use of these aids.

Projection devices such as the 16mm. machine and overhead projector should be covered or stored in cabinets which keep them clean and free from handling. In use they should be mounted on sturdy portable tables which facilitate movement and operation of the machine.

The projection screen should be mounted permanently in the room so that it is readily available.

There is certainly no harm in training certain students to operate projection equipment. Such instruction can become a worthwhile part of the curriculum.

Complicated blowups and three-dimensional models should usually be stored out of sight until needed. Some wall displays and samples of materials should be mounted neatly on permanent panels and lighted in such a way as to make them most effective. Flip charts and posters of all kinds should be stored flat or by some other arrangement to prevent their curling. They should usually be brought into sight at the right place in the curriculum. Every shop, laboratory, and classroom should have adequate blackboard space. This oldest of training aids is still perhaps the most versatile and useful in industrial arts.

One instructor brought a microscope into the shop each semester for a few days as a special training aid. Youngsters who need to develop judgment regarding the characteristics of sharp or dull cutting edges can learn much from seeing these edges under the microscope. Obviously, as the microscope had to be borrowed from another department; its proper use and prompt return was a requirement in order to assure its availability the next time it was needed.

Bulletin boards deserve special attention. Probably few if any materials should be left up longer than two weeks. I was surprised on visiting a shop I had taught in two years previously to find the same newspaper clippings — yellow with age — still on the board.

All of these things have important public relations value. The industrial arts teacher should care that his department is progressive and alert to the place of industrial education in the educational system. □

DESIGN for the TEACHER

Design Guideposts – Appearance

john r. lindbeck

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When designing a project, one must consider the *functional requirements,* because a project should suit the purpose or need for which it is intended; *material requirements,* because a project should reflect a simple, direct, and practical use of the substance of which it is made; and *visual requirements,* because a project should not only work properly and be honest and economical of construction, but it should also look well. Previously, the topics of function and materials were treated; this discussion is given over to appearance and its related problems.

— The Stiffel Co.

Visual Requirements

A project or product should have a pleasing appearance to the beholder. This without any doubt is the most difficult of the three criteria to follow or evaluate, for the simple reason that there are no firmly established, immutable standards of beauty or appearance. Persons' tastes differ as much as their looks or personalities or physiques. This is not meant as a dismissal of the importance of appearance. On the contrary, to stress that however elusive the quality of appearance, it is of vital concern.

Most design or art textbooks have a chapter or two devoted to "the elements and principles of design." This, in six words, sums up the context of the term, "visual requirements." It has to do with proper balance, correct proportion, compatible colors and textures, and form. It means that through practice and the cultivation of a discriminating eye, one can distinguish between the beautiful and the ugly, and apply this knowledge to his design tasks.

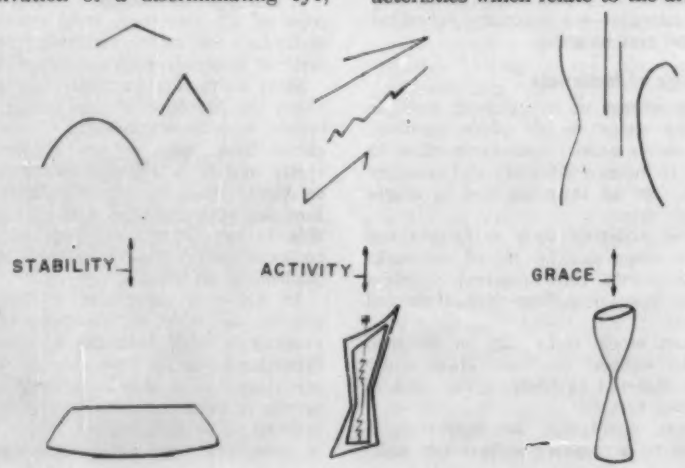
Design Elements

A person's ability to apply this knowledge rests with his understanding of the visual symbols with which he works in the process of designing. These symbols, fundamental to design, are called *the design elements;* they are the lines, the planes, the solid forms, and the surface treatments which are used in graphically representing an idea. These are, quite properly, called elements of design because they are basic to every two- and three-dimensional object; they are the building blocks of all structures or forms. A line can reveal much about the nature or purpose of an article. For example, one of the lines in the illustration suggests grace and such grace is reflected in a dignified candlestick. Lines can also show stability and activity, and can be organized in a manner to create forms which will reflect these characteristics; the restful stability is apparent in a salad bowl, as is the attention-arresting activity in a piece of costume jewelry. Lines are used in combinations to create planes and the planes in turn are organized into solid forms; lines are truly basic to all designing.

The surfaces of the planes and solids can be enhanced, embellished or changed by adding color or by texturing. Such surface treatment can add interest or emphasis to a design and, thereby, improve its appearance. The lamp in the photograph exemplifies the wise employment of surface treatment with its textured shade, satin brass stem, and white china base. Notice the interesting contrasting effect which results.

Design Principles

The *design principles* are the characteristics which relate to the arrang-



ing of the design elements. Some of the significant principles as applied to project design are unity, variety, and proportion. Unity and variety are closely related. Within a design there must be a common feeling or similarity among the component parts in order to achieve a sense of belonging; at the time there must be sufficient diversity or variety among the parts for the sake of interest. The lamp is a further illustration of this. Proportion as a principle deals with the relationship of the size of one part to the whole. It is directly related to the concept of balance in that the quality of equilibrium is achieved and sustained only through the proper proportioning of the parts of any whole. Ratios of approximately one-to-three, or two-to-three, are generally considered good; the teak buffets are examples of well-proportioned pieces of furniture.

Sensitive, well-designed objects are never achieved by memorizing a long list of design principles and another list of rules or generalizations regarding their proper applications. One does not set out to design a "well-proportioned, well-balanced" buffet; neither does one consciously attempt to create a "unified" lamp, or a chair to exhibit "variety." Instead, one approaches upon a design task with an open, creative mind, searching for form, experimenting with combinations, sketching possible contours, to the end that the object will reflect good organization of elements. Experience and practice, study and reflection will lead to the ability to discriminate among sensitive and awkward forms. When this feeling of rightness about an object is present, the parts of a buffet will be in proportion, a lamp will look as though the parts belong to a unified whole, and a chair will have the interesting variety. If the feeling of rightness is in fact absent, the buffet becomes clumsy, and the lamp or chair will appear as disorganized, busy, jumbles of unrelated parts.

The experienced designer clearly sees the relationships among the three design requirements. He recognizes that *function* will dictate or suggest certain forms for an object, that the forms will dictate or suggest certain *materials* and structural techniques, and that both of these must be dealt with creatively in order to achieve a pleasing *appearance* in an object.

Consciously or unconsciously, systematically or haphazardly, the designer must give consideration to all three of these requirements — function, materials, appearance — if he is to realize the creation of sensitive, successful articles. □

☐ *Try a small group approach to —*

Simplify Your Junior High Personnel Setup

JAMES H. DOWDLE

Here is a suggestion concerning the organization of pupil personnel at the seventh and eighth grade level that offers: (1) a more efficient use of teacher time — hence more time for actual teaching; and (2) a more effective pupil personnel organization in regards to shop clean-up — with the small group approach.

Confusion Every Time

Most pupil personnel organizations have as their objective theoretically, broad implications of an industry oriented program embracing everything from safety to shop maintenance. In reality most programs are concerned only with shop clean-up at the end of each period. My contention is that, in the seventh and eighth grade industrial arts program, it is more realistic to have a simple program of shop clean-up that takes teacher supervision only during the last three minutes of each class period rather than the more widely used, intricate system of an elected shop foreman supervising the rest of the class as they rotate week by week in confusion to a different clean-up job. In this type of organization, a small amount of clerical work by the teacher each week is a necessity.

A New Approach

A more expedient method for seventh and eighth grade organization is to divide the class alphabetically into groups of 3, 4, 5, or 6 pupils each, depending upon the enrollment of each class and the number of "job categories" that the instructor feels are needed. These groups are given the numbers 1, 2, 3, and 4 for identification purposes. The students will stay in the same numbered group all semester but will rotate through the various "job categories" week by week with the others in his group.

Mr. Dowdle is an industrial arts instructor, Fayetteville-Manlius Junior High School, Manlius, N. Y.

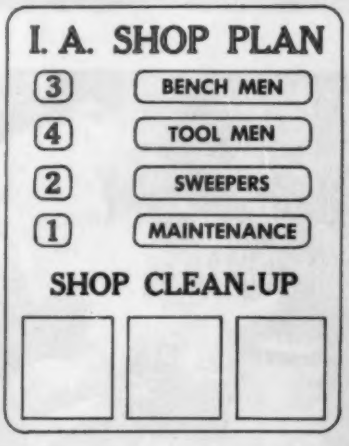
As an example, an organization with four "job categories" would include: tool men, bench men, sweepers, and maintenance men.

Once organized and fully explained this group approach to the shop clean-up program, at the end of each work period, should require less teacher time than other complex programs do in many schools.

Organization is the key note to any successful program.

For handy reference in day-to-day activities, a visual aid consisting of a small personnel chart listing "job categories" in large letters, with a space for a group number in front of each category is very worthwhile. (The group numbers are mounted and movable so that they may be changed each week or periodically and very easily, thus rotating everyone into a new "job category.") □

The simplified group assignment chart. The group numbers are movable, so that rotation to a new "job category" is simple. At the bottom of the chart are detailed, typewritten instructions outlining areas of responsibility.



LOST WAX CASTING WITH LEAD

JACK BURGNER
Assistant Professor, Art Education
School of Architecture and Applied Arts
University of Oregon, Eugene

It was not surprising to find most art people, who were children during the late 20's and early 30's, either remembered hearing of, or who had themselves cast lead soldiers with one of those "lead casting sets." Thinking back over those days, it was agreed the casting was nearly always done in someone else's mold (cast iron from the Gary Steel Mills). There seems to have been two heat sources for melting the lead. One, on the gas or electric stove in the kitchen with an old iron skillet or a complete set with electric heater which melted lead. In that case, all the child had to do was trip a lever which allowed the lead to pour into the waiting mold. The latter allowed freedom (it was advertised), the mold could be exchanged from an army marcher with rifle, to a man on horse back.

Whatever the case, we did cast and today toy stores do not handle any such toy. One thing for sure, the toy manufacturers have probably forgotten, because scruples play such an unimportant part it would never occur to them the child could make his own mold.

All of this started some thinking which led to some research — that produced added information about the lost wax casting of the early Egyptians and Africans:

"The lost wax or cire-perdue process is the traditional method of casting in bronze. It appears from early bronzes that this method or one very similar to it has been used by sculptors for at least 5000 years. The ancient Egyptians employed the lost wax method, casting over ash cores. The Greeks and the masters of the Italian Renaissance used it extensively in casting and jewelry. The famous Benin bronzes were also produced by means of the lost wax process; African knowledge of the method is believed to have been derived from the Portuguese in the 15th century."[1]

Steps in the process of "lost wax" casting with lead: from top, carving with a variety of tools; submerging the wax into can of plaster; melting out the wax by resting the inverted can on nails to allow the paraffin to drip out and burn off in smoke; pouring the lead in an even, steady flow.

Lost wax with those craftsmen meant the molten bronze would replace the wax after it had been cleared out in the form of smoke.

Actually, the lost wax process is most generally restricted to small sculpture. Larger pieces are handled with sand molds but in so doing, the opportunity for detail is reduced. In our case, lead simply replaced bronze for convenience. We had to have a metal that could become fluid with relative ease. Lead placed in a tin can melts, on a hot plate turned on medium. Our lead was from the local junk yard and was primarily old cast-off car wheel weights. The wax was common sealing paraffin used for canning.

Actually the difficulty, if any, occured when handling the wax. It was found by allowing the children to work first and explore the media, this curbed all future inquisitiveness. After the exploratory period, on they went, able to take a direction and carry the thought through.

Possible Procedures

1. Carving with a short bladed knife was the way most chose to handle the wax. In many cases this left marks. The flat cut of the blade and, when cast, the resulting roughness provided a pleasant relief.

2. Warming the cake and modeling was another popular method. More time was required — time to warm the wax through, otherwise the blocky shape of the wax remained.

[1] Jack C. Rich, *The Materials and Methods of Sculpture* (1947); Buffalo Fine Arts Academy, *Master Bronzes* (1937).

3. Building up by painting over a wax skeleton was also used, at least partially, and this also works combined with the first two.

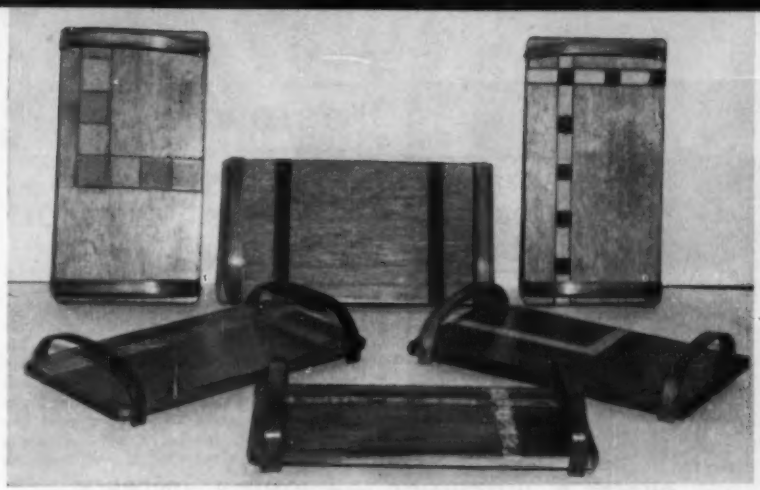
4. Another, although untried with our sixth grade, is to rough out a simple mold of oil base clay and partially cast the melted wax. This can be then carved and smoothed with a warmed knife blade.

At any rate, this is one of the very few projects given in the Children's Art Lab here at the University that stimulated enough interest so the sixth grade youngsters took the project home. Better yet, some came back with the object completely finished. One definite conclusion was that we were able to witness the effectiveness of self-motivation. The desire of the youngster to pursue the project was because of personal interest. The rewards from these classes were their own and this chance for independence and self-achievement was strongly accepted.

Using common molding plaster, the wax object was submerged into a tin can which aliowed at least a 1½ to 2-in. thickness between the wax and the outside. Quart or ½-gal. milk cartons are also excellent. After the plaster sets up, a funnel shaped opening is cut into the plaster block which exposes one end of the wax figure. After leaving at least overnight, the model is turned funnel down and a 1/16-in. hole is drilled into the wax from the bottom and all four sides. The amount of holes depends on the complications of the object but a hole for trapped air to escape must be provided wherever necessary. These are later plugged with cooled lead, clay, or toothpicks during the actual casting.

After these vents are opened, gradual heating begins. We set the inverted can on the hotplate near the window sill in a No. 10 (gal.) tin can resting on three small one inch nails. The length of time to clear the mold depends on the amount of wax and plaster. The paraffin melting out burns off on the tin can bottom and the smoke must go out away from the observer. Once cleared (no more smoke from melted paraffin), the mold is already hot and so is the best time for the melted lead. Be sure the mold is completely cleared of wax! A fluted lip is shaped into the lead container which will become the ladle for the melted lead. After melting (again, stay away from the lead fumes), the lead is poured into the funnel opening in one continuous small stream. This can easiest be handled by pouring all the students' molds at once. In 30 minutes, break off the plaster. Cutting or trimming the air vent "wires" complete the project.

Washing the lead in a nitric acid. bath, 1/20 part acid for one part water, will clean, but it is not necessary. Then submerge or paint on liver of sulphur (potassium hydrosulphuret) for quick tarnish or oxidation. A gentle buffing with an old turkish towel will bring out the raised surfaces giving nice contrasts. □



SNACK TRAY

WALLACE F. FILLINGHAM

Instructor of Woodworking

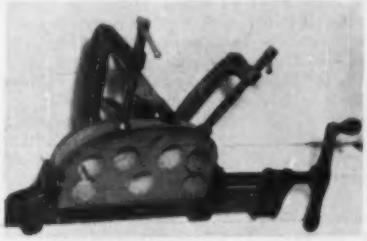
Central High School, Grand Rapids, Mich.

This attractive, but easy to construct, snack tray will fit very nicely into most junior high industrial arts programs. Dimensions of this snack tray have been purposely omitted so that each student may develop his own keeping in mind the value of proportions. The basic tray is cut from any available solid wood but other materials such as mosaic tile, copper, brass, aluminum, or formica can be inlaid in the surface. Caution should be taken that students do not carry this surface enrichment to extremes.

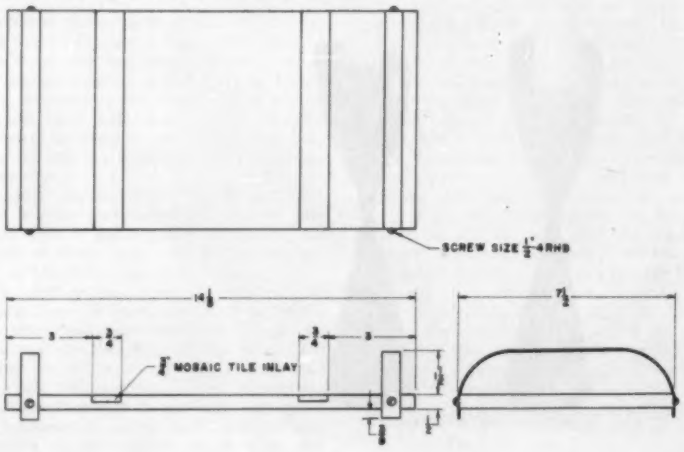
The handles are made from four narrow pieces of 1/20-in. veneer laminated together around a heavy wood form until the glue sets. The handle edges are then sanded smooth and round until they are comfortable to grip. Some students may prefer to add a slight contour to the handle edges.

Notches are carefully cut into each edge of the tray to hold the handles. Glue and a ½-in. —4 r.h.b. wood screw will secure the handles in place. Care should be taken that students do not allow more than a 1½-in. clearance from tray to the top of the handle. After the handles are secured in place. the handle ends which serve as legs are carefully measured and cut off with a fine tooth back saw. For best appearance, these legs should not be longer than ⅜ in.

Finish on the snack tray is optional with instruction to clean with a damp cloth only. □



How laminated handles are formed with a form and clamps.



project design sheets

TURNED CANDLESTICKS

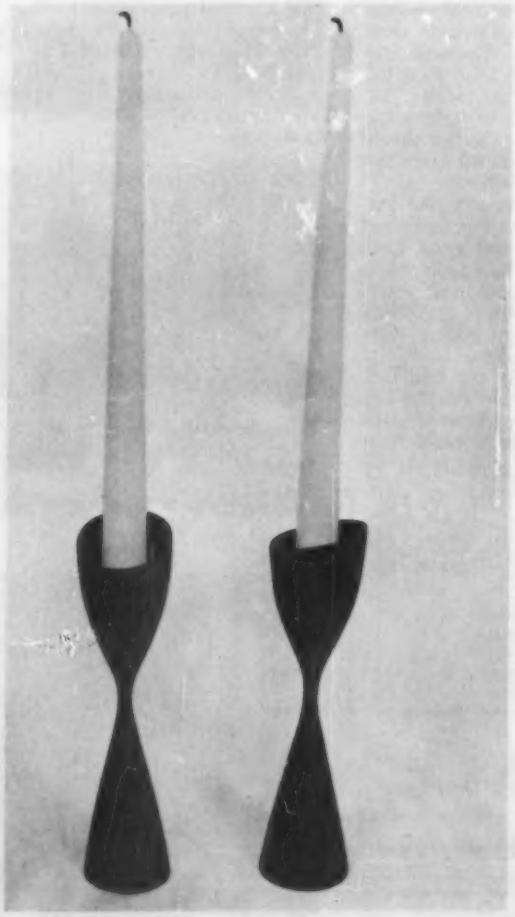
GILBERT R. HUTCHINGS and JOHN R. LINDBECK
Associate Professors of Industrial Education
Western Michigan University, Kalamazoo

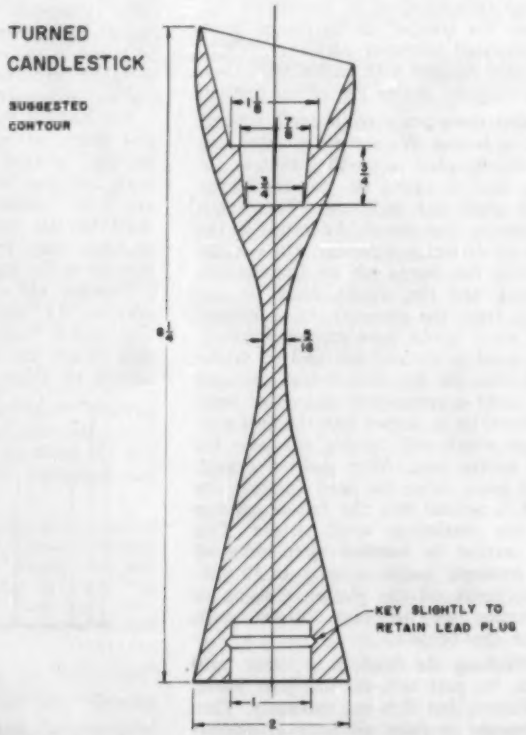
These candleholders typify the graceful appearance which can be obtained with wood turning. Moving from a basic consideration of the function of such a piece, the designer can sketch some visual impressions which can guide the work — over-all dimensions and general contours. The sketch will not restrict the maker for improvements or alterations can be made as the work progresses. The particular grain structure of the wood can suggest pleasing forms or the harshness of a line can be refined quickly with a touch of the chisel. In any event, the watchword should be simplicity. Avoid the multiple beads, V grooves, and monotonous rounds; strive instead to achieve an interesting piece through restrained, sensitive, dignified curves.

The shape of the illustrated sticks is emphasized with the gentle sloping of the top. This suggested feature, as well as the over-all form, serves only as a guide to the turning process. The individual is encouraged to make any changes he feels are necessary in realizing a striking pair of candlesticks.

Plan of Procedure

1. Obtain 2 pieces of stock, 2¼ by2¼ by 8¼ in. (If 2¼-in. stock is not available, the base diameter could be reduced. However, it should be kept as close to 2 in. as possible. It has been found that if the stock is carefully selected from 8/4 lumber, it will run a little thicker and the full diameter





can be easily turned.) *Make sure the ends are square.*

2. Locate the centers (do *not* saw diagonals, the stock is already cut to finished length) and bore a 1⅛-in. hole, 1½ in. deep. This should be done in the lathe with the chuck mounted in the head stock and the work held against the dead center. This will insure that the hole will be concentric with the turning when the project is finished.

3. Using the center of the hole previously bored, bore another hole ¾ in. diameter and ¾ in. deep.

4. Turn a plug of hardwood between centers 3¼ in. long and ¾ in. in diameter. The diameter should be accurately turned so that a friction fit is obtained when the plug is inserted into the bored ¾-in. hole. In order that the plug chuck can be properly fitted, turn the ¾ in. end next to the dead center. Try the turning periodically (as the work progresses) in the bored hole to insure a tight fit.

5. Force the plug into the ¾-in. hole and mount the assembly between centers in the lathe with the plug on the dead center.

6. Rough turn the piece to slightly over 2 in.

7. Reach inside with a tool and turn the taper on the inside of the top of the holder. This is not a critical dimension, just make a smooth taper.

8. Turn the outside contour of the top and bottom and gradually work down to the 5/16-in. dimension. (NOTE: Keep the material as strong as possible as long as you can. It is recommended that the parting tool *not* be used when shaping.)

9. Complete the turning.

10. Rough sand with 1/2 or 1/0 abrasive paper, depending on the species of wood being sanded.

11. Finish sand with 5/0 abrasive paper.

12. Remove the stock from the lathe.

13. Re-insert the chuck in the head stock and bore a 1-in. hole about 1 in. deep to receive the lead in the bottom of the candlestick holder.

14. Remove the candlestick holder from the lathe and key this hole that was drilled previously to receive the lead. One could also insert a wood screw in the bottom of the hole leaving about ½ in. of the screw projecting so that the lead would be held in place by flowing around the head of the wood screw.

15. Hold the turned candlestick holder in a V block, sand the top to the desired angle on either the belt or disk sander.

16. To bring the flat area that resulted from the belt sanding to a sharp edge, hand sand the outside contour.

17. Make a cardboard profile pattern of the first turning. Use this as a template when turning the second candlestick.

18. Pour the lead in the bottom of the candlestick holder.

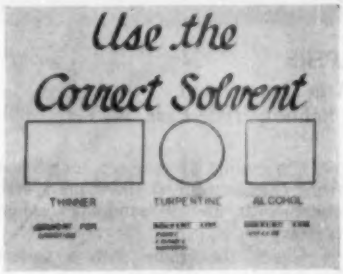
19. Carefully hand sand the candlestick holder with the grain with a very fine grit abrasive paper.

20. Finish as desired. □

capsules

A NEW APPROACH TO SOLVENT STORAGE

The problem of preventing students from using the wrong solvent when cleaning a brush in shops where a variety of finishing techniques is taught is one that is encountered by many industrial arts teachers. Since a different solvent is used for many different types of finishes, the student often has the problem of determining which solvent to use when cleaning a brush and how to distinguish one solvent from another. After a solvent has been used several times, it becomes difficult to dis-



tinguish from the other solvents by color or odor. Color coding the cans containing the various solvents will work to some degree but the cans tend to become discolored after a short period of use through the action of the solvent.

One solution to the problem is the use of different shaped containers for each of the different types of solvents being used. The shape of the container is keyed to a wall chart located in a conspicuous place close to the finishing area. The chart gives information as to what solvents are contained in the different shaped containers and what solvent is used with the different finishing materials used in the shop. The end result of this method of teaching will be cleaner brushes and quicker learning of the different types of solvents used for finishing materials. □

John Sommer, Industrial Arts Department, South Shore High School, Chicago, Ill.

ASPHALT ROOFING USED FOR SURE FOOTING

Concrete floors in a woodshop can become very slippery — especially when a little wood dust has been scattered over it. (Of course, concrete is not good as a floor for a woodshop, but many times we instructors have little to say in the planning of a new building or new shops especially when the urgency is present and expediency comes first.)

Asphalt roofing ridge roll cut into desired lengths and cemented around machines with a good grade of asphalt tile cement emulsion makes an inexpensive but very satisfactory skid-proof footing.

The author has used this material in his shop for the past two years and finds it to withstand wear very well. The original is still on the floor. If the granulated coating should wear off, the asphalt and paper will still serve as a nonslip footing.

One disadvantage is the fact that gasoline, kerosene, or certain paint thinners will, if spilled on the asphalt, cause it to dis-

solve. Since these materials are seldom used around woodworking machinery, however, this seldom happens. □

Arthur W. Gilliam, Wood Shop Instructor, Highland, Ind., High School.

TEACHING THE NAMES OF TOOLS

The method employed in our industrial arts shop to teach the names of tools to be used has proved to be very successful. It has been effective not only in the minimum amount of time required but in the retention rate. It works best with seventh and eighth grade pupils but older boys may also be satisfactorily taught the names of tools and equipment:

1. Make up 3 by 5-in. cards. Letter in bold black ink the name of each tool on one face of each card.

2. Place tools, as few as practical, on each bench or table top so that it will be necessary for the group to move often as they observe each tool and card. This gives the pupil the opportunity of movement so that he remains alert at all times. As many as 40 or more tools should be taught.

3. The teacher points to each tool while the pupils pronounce its name. A brief introduction is given as to the background, value and use of each tool. This is the provision of learning by association. The pupils are asked to write the list of names.

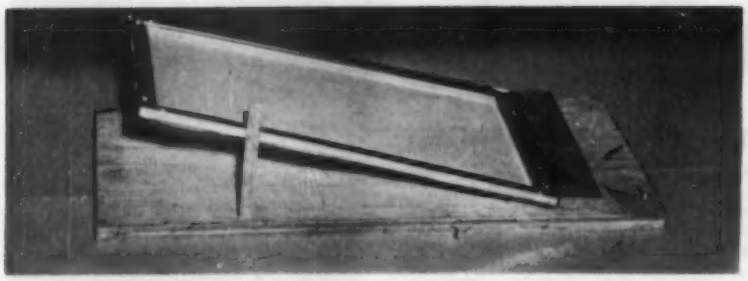
4. Following this introduction by the teacher, one of the members of the class is asked to point out the tools and again the class pronounces the name of each.

5. Next the cards are turned face down and boys are asked to give as many names as possible. Each boy continues to name the tools until he fails whereby another boy takes over. As many boys as possible should participate in this but even those observing learn since they are trying to "catch" the boy giving names in error. This makes for a competitive spirit and is very conducive to learning. It seems that the boy who has a lower scholastic record usually enjoys much success in this process.

6. When the class appears to be ready for it, a test is given and the grade recorded. Pupils are to write down the name of each tool as it is shown when the identification cards are removed.

7. Boys receiving less than an average grade (80 per cent) are asked to repeat the procedure and are given a second test. It is very important that this is explained *before* the teaching process is started. □

G. Cardinale, Roosevelt Junior High, Erie, Pa.



ALUMINUM SILK SCREEN FRAMES

STUART ALPERS

Chairman, Industrial Arts Department
Franklin Delano Roosevelt High School, Hyde Park, N. Y.

From the author's experience, the use of aluminum silk screen frames has been most successful. Their ease of construction offers flexibility in regard to size and storage over the conventional wood frames. These frames may also be disassembled when not in use and reassembled with very little difficulty. The frames are made from "do-it-yourself" aluminum screen frame No. 24, and insert corners No. 25 that may be purchased at any local hardware store. The frame can be made to any desired size, depending upon the job to be produced. Keeping in mind, of course, that there should be space at the ends of the frame to hold the paint while the sides should be wide enough to permit free movement of the squeegee.

Construction Procedure

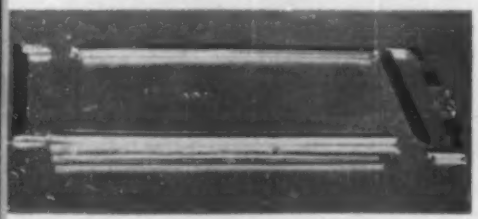
1. Once the size has been determined, remove the U-shape spline from the length of the frame member.

2. Miter the frame members with any fine tooth saw, and deburr with a file or sandpaper.

3. Begin assembly by pushing corner lock inserts into the ends of miter members. To secure extra rigidity on larger frames, small angle corners may be screwed to the top of the frame at the corners with sheet metal screws. Omitting the small angle corners, and just using sheet metal screws will also add some rigidity.

Right: several steps in fabricating the frames.

Below: a layout of the parts used in making the frame.



4. Cut spline to correct length, allowing for assembly at the corners. Also deburr with file or sandpaper where necessary.

5. Check the frame with a square. Cut the silk to the outside size of the silk screen frame and apply a ¾-in. strip of masking tape around the edge of the silk. This will insure a secure fit in the spline groove. Spreading the U-shaped spline may eliminate the use of tape. The U-shaped spline can be widened by running a strip through the end of the spline.

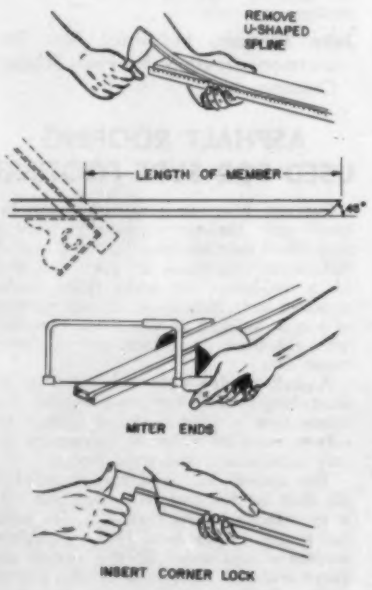
6. Place the frame on the bench with the groove side up. The silk is then laid over the top of the frame. One side of the silk is then driven into the groove under the spline with a small wooden block and hammer. The silk is then stretched and the other side is forced into the groove in a similar manner. Repeat this same operation for the last two sides. Be sure the screen is free from wrinkles, and that the threads are stretched parallel to the sides.

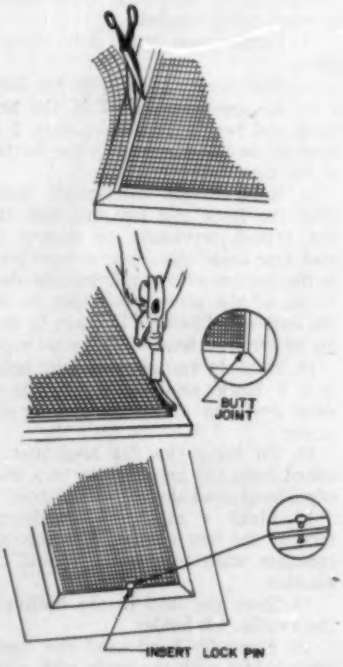
7. To secure additional tightness, the silk may be soaked in warm water. This removes the sizing. However, if organdy is used, do not soak it in water.

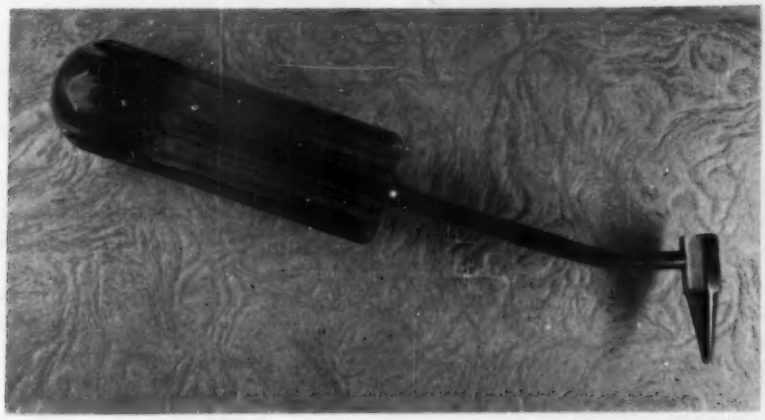
8. Two-and-a-half in. narrow loose pin hinges are attached with sheet metal screws to the frame. The screen is then fitted to its baseboard.

9. The baseboard, upon which the screen rests, is then made. It should be at least 2 in. wider and 6 in. longer than the silk screen frame. A flat ¾-in. piece of plywood is excellent for this purpose. A strip ½ in. thick and 3 in. wide is fastened across one end of the plywood. The loose pin hinges are then attached to the sheet. This enables one to raise, lower, and remove the frame without losing registration. A strip of ⅛ by ⅜ by 6 in. is inserted along the side, to keep the frame from going all the way down, while removing the copy. This is attached by using a sheet metal screw so that it can swing to an off position for printing.

10. A ¼-in. hole is drilled through the frame and into the baseboard opposite the hinges. A slightly tapered dowel is inserted in the baseboard. This insures proper register as the pin will fit through the frame when opening and closing the screen. □







CONSTRUCTION OF THE OFFSET NAIL SET

R. L. TUPPER
Instructor of Industrial Arts
Central Connecticut State College, New Britain, Conn.

The construction of this unique and extremely practical hand tool provides the student with many interesting and challenging learning experiences in the metalworking field.

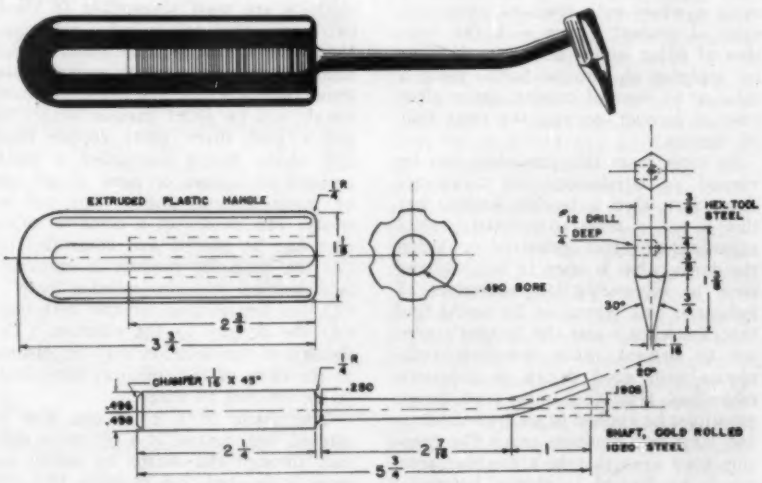
This writer has employed the offset nail set upon innumerable occasions and for a multitude of purposes. It is particularly useful for setting small nails and brads, where the hand holding of a conventional nail set often limits the view of the fastener and working area and when required to set or drive nails into corners or other restricted spaces. In general, this tool design makes possible a heretofore unrealized feel and control of nail setting operations. Other tip styles, fashioned to serve many requirements, may be designed to fit the basic handle and shaft section. Offset screwdriver heads, punches, chisels, and special automotive tools and devices are just a few of the possible adaptations.

Materials Required

1. Round hexagonal fluted plastic screwdriver handle stock: 4 by 1⅛ in.
2. Round, cold rolled, 1020 steel: 1½ by 6¼ in.
3. Hexagonal tool steel: ⅜ by 1½ in.

Procedure

1. Produce each of the three parts in accordance with the plan sheet and specifications provided. Insure that tolerances are noted and held.
2. Harden and temper the nail set head.
3. Polish all metal parts and wet sand the plastic handle.
4. Press fit the shaft section into the nail set head.
5. Press fit the shaft and adjoining head into the plastic handle.
6. Using a bending jig or other suitable bending device, offset the shaft twenty degrees (20°) as indicated in the plan.
7. Holding the tool by its metal section, dip the plastic handle into acetone [$(CH_3)_2CO$] to yield a bright and clear finish.
8. The project is now completed and ready for use. □



☐ *Information for a unit on metal finishing*

which links pure science and industry with industrial arts —

COLORING METAL

PAUL SHEIN
Forest Hills, N. Y.

Various methods of coloring metals can be introduced within a high school general shop course of study. Here is an opportunity to extend our teaching into an area of learning based on industrial techniques and pure science. A normal high school general shop project, for example, either in an art metal area or in a machine area of learning is usually finished by simple but inadequate techniques. Let us examine the usual finishing operations after a student has completed forming a copper bowl. A normal procedure is to smooth out the copper bowl after forming using a series of emery cloths, from a coarse grade to a finer grade, finishing with a rouge cloth. Then the student proceeds to the polishing wheels where considerable time is spent first using a wheel with tripoli and ending the operation using a wheel with jewelers rouge. Finally, a student is left with the decision of either hiding his hours of labor by applying an antique finish, using a solution of liver of sulphur and a clear coat of lacquer, or just the clear coat of lacquer.

In most cases this procedure can be viewed as satisfactory for a general shop. But when a teacher knows that this is not a really completed project according to either industrial or design standards, what is open to him? If one were to investigate the objectives of industrial arts education he would find that a student's and the teacher's aims are to present other industrial techniques with good design in industrial education. How then may good design principles be applied to an area of learning, such as a machine area? The question may arise that in a machine area, aren't we limited to simple functional and structural design principles? I say NO. A project of any design whether it be mechanical, as in the machine shop area, or modern or contemporary, as in the art metal area, can and should be finished properly. We in the industrial arts field know that all industrial products go through extensive finishing operations before being put on the market. Then is it not wise for us to at least try to imitate some of these industrial procedures by finishing our school shop projects in a realistic, industrial manner.

One significant point should be mentioned in referring to the antique finish applied to copper products. This antique finish, called the "Copper-Bronzing Finish", can only be applied to copper. Since copper and brass are the two most frequently used materials in a general school shop it is to our advantage that the so-called older coloring methods are most susceptible to these two metals than to any other materials. Using brass as the base material the following comments will endeavor to show that this and the other common metals can be given various shades of yellow, gold, silver, white, copper, blue, and black. Metal containing a small amount of copper or none at all can be given various colors, but not as easily. The shades of a color in either case can be altered and controlled by (1) the time the product is immersed in a chemical solution (called a "bath"), (2) the temperature of the bath, and (3) the density of the solution. (The density of the solution may be defined as the ratio of the chemical ingredients to the amount of water.)

The shade of a color can also be altered, but control is a bit more difficult through the means by which the work is finished. For example, if a cotton buff wheel is used, one shade will produce a lustre finish as compared to a dull finished product obtained on a surface that had been worked on a scratch brush wheel.

Before delving into the numerous types of metallic colors and finishes that can be obtained through the use of simple and inexpensive chemicals, let us examine some of the basic required steps that a product must go through before it may be finished properly.

Five Steps for Preparing and Coloring

1. *Smoothing.* Removing all scratches, pit holes, and oxides from the surface of the metal by mechanical means and emery.
2. *Polishing.* Producing a highly polished and smoother surface by means of various polishing compounds such as tripoli and rouge.
3. *Grease and oil removal.* Washing and soaking the products in common solvents such as benzine or acetone.
4. *Chemical cleaning.* Removing any remaining grease and oil films, oxides, and residue from the grease solvents. Usually completed in a pickling solution.
5. *Coloring the metal.* Using the various chemical and other treatment outlined in the following paragraphs.

In the above listing the five basic steps are detailed and defined for coloring a metal. In the following analytical explanation, steps one and two are omitted, since they should be of common knowledge to any student of industrial arts.

Step 3. Grease and Oil Removal

When a metal surface is to be prepared for coloring, two types of chemical solutions may be used for cleaning the metal. To remove grease and oil from small parts, they may be dipped

STEP 5. COLORING METALS (NON-FERROUS)

Color	*Solution*	*Control*	Notes
Golden Yellow	Caustic Soda, 5 parts (by weight) Water, 50 parts Copper Carbonate, 10 parts	Regulation of immersion time	1. When desired shade is reached work must be washed well in water 2. Dry in sawdust 3. Apply clear coat of lacquer
Rich Gold (Method A)	Saltpeter, 2 parts (by wt.) Salt, 1 part Water, 24 parts Hydrochloric Acid, 1 part	Boiling time	1. Object is boiled in solution 2. Wash, dry and lacquer
Rich Gold (Method B)	Alum, 3 parts Saltpeter, 6 parts Sulphate of Zinc, 3 parts Salt, 3 parts	Heating time	1. Apply mixture 2. Heat work over hot-plate until it turns black 3. Rub well with vinegar 4. Wash, dry and lacquer
Green (Verde-Antique)	Chloride of Iron (crystallized), 3 oz. Ammonium Chloride, 1 lb. Verdigris, 8 oz. Salt, 10 oz. Potassium Bitartrate, 4 oz. Water, 1 gal.	Immersion time (for large objects the solution can be brushed on)	1. Same as for Golden Yellow
Blue or Black	Sulphide of Lead, 8 oz. Hyposulphite of Soda, 8 oz. Water, 1 gal.	Immersion time	1. Solution must be used hot 2. Articles will first turn yellow, then blue, then black (may be stopped at any of these colors) 3. Wash, dry, lacquer
White Color	Silver Chloride percipitate, 2 oz. Potassium Bitartrate, 2 oz. Water (to form a cream)	Coating of the mixture	1. Immerse article in mixture until properly coated 2. Wash, dry and lacquer
Silver Color	Silver Chloride, 1 oz. Potassium Bitartrate, 2 oz. Salt, 3 oz. Water (to form a cream)	Application of the mixture	1. Rub the mixture onto the article. Use a soft cloth 2. Wash, dry and lacquer

COLORING METALS (FERROUS)

Color	Solution	*Control*	*Notes*
Blue	Nitrate of Potash at 600° F.	1. Immersion time 2. Temperate of the medium	1. Suspend articles, use wires into heated medium 2. Quench in water or air cool 3. Dry and oil
Black	Nitrate of Potash, 16 parts (by wt.) Black Oxide of Manganese, 2 parts/wt. mixture at 600° F.	1. Same as above	1. Immerse articles and stir medium constantly 2. Managese oxide must be replenished from time to time 3. Cool either air or water 4. Dry and oil
Copper	Distilled Water, 4 oz. Copper Sulphate (an excess amount) Sulphuric Acid, 10–15 drops	Number of coatings	1. Store solution in a glass bottle with plastic cap 2. Wipe dry and lacquer 3. Excellent for layout work

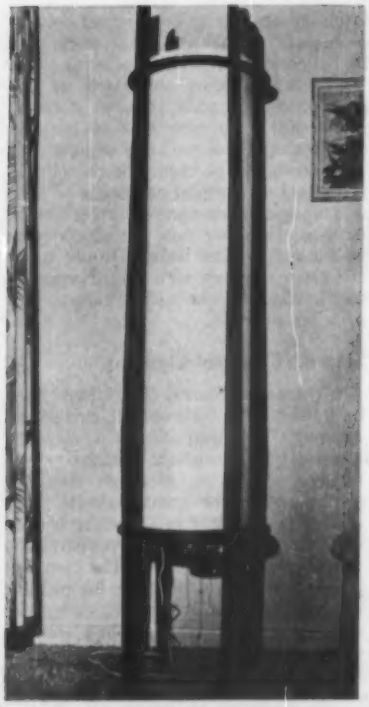
in either benzine or some other solvent for grease. Larger pieces of work may be boiled in a solution of caustic soda. The solution being composed of one part of caustic soda and ten parts of water. For such metals as tin or zinc or alloys of these metals a caustic soda solution cannot be used. Then a solution composed of one part carbonate of soda or potash and ten parts of water should be used. In either case the object must be washed in clear water. Do not touch the clean surfaces with the fingers, but handle the objects with either a pair of tongs or wires.

Step 4. Chemical Cleaning

All grease removal operations must be immediately followed by a chemical cleaning. The purpose of a chemical cleaning, as previously outlined, is to remove all traces of any remaining grease and/or the grease solvent. This residue may appear as a green or brownish film which is formed primarily on copper, brass, bronze, etc. The composition of the bath or mixture for pickling as it is commonly called, varies for different metals. The pickling solution that is most commonly used for cleaning copper and its alloys is composed of a mixture of 100 parts of concentrated sulphuric acid and 75 parts of nitric acid. If the metal is to be given a high polished finish, called a luster finish rather than a dull or mat finish, add about one part of common table salt to 100 parts of the pickling solution by weight. A better solution for a dull, mat finish would be composed of 90 parts of nitric acid, 45 parts concentrated sulphuric acid, 1 part salt and from 1 to 5 parts of sulphate of zinc, by weight. After all pickling operations have been completed the metal articles must be washed in clear cold running water and dried thoroughly.

In Summary

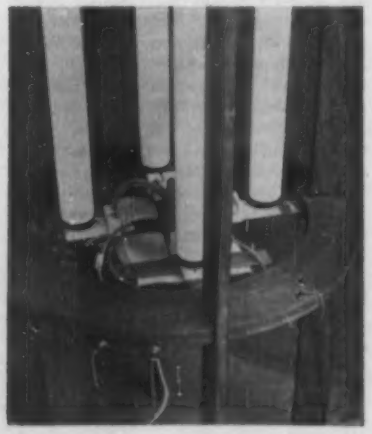
A normal course of study in a high school general shop should be altered to include some of these techniques of coloring metals by chemical means. The learning aspects that a student can gain from either partaking or witnessing these operations are numerous. With these methods, even though quite old in age, a student can observe and appreciate how a pure science, chemistry, plays an important and leading role in the machine products industry. The student will be shown better methods of appraisal when he purchases finished goods. Almost all of our metallic industrial products go through finishing operations and a student, if shown the basis of these finishing operations, will be able to tell at a glance whether a product has been either plated or colored and has been done so properly. After a student has gone through at least one of the coloring operations, he will better appreciate good workmanship found in the metal finishing industry and in turn he will learn to produce projects of a higher quality and on a level equal to that of today's industry. □



LET THERE BE LIGHT!

R. W. SHACKELFORD
Associate Professor, Industrial Arts Department
San Francisco State College

Two views of the lamp with the shade removed, illustrating how the sockets and the ballasts are strapped to the underside.



Over a period of years, and especially within the past five years, there has been a healthy trend toward more light for better sight. Industry is now manufacturing more efficient bulbs for direct and indirect lighting. Manufacturers of lighting equipment have caught the ball and are making fixtures that are cleaner in design. It seems as if the floor and table lamp industries have been especially sensitive to this trend. Pole lamps were a partial answer; companion floor and table lamps have been another means for achieving more light in the same room. Although lamps run the gamut from conservative to bizarre, regardless of design. the theme seems to be — lamps should be made to emit light in the most efficient and effective manner possible.

With the thought in mind of trying to keep projects in industrial arts up to or ahead of industrial standards, this modern barrel-type, fluorescent lamp of teakwood has been constructed. There are many ways one could construct a lamp of this type. This particular way was chosen, for it encompasses more than one industrial arts area and involves many experiences for the student.

One view shows the way the rings are laminated. After the pieces were fitted to a full-sized paper pattern, braded, and glued, two pieces of ¾ in. plywood were used as a top and bottom board to obtain a good joint. (NOTE: Place the brads so they will either cut to waste material or not affect the chamfer cut.)

The shade is shown removed, illustrating the arrangement of the fluorescent lamps. The lamps are wired so one daylight and one warmlight are on the same ballast and opposite each other. This tends to keep the light, color, and intensity equalized within the shade.

The view of the lower ring with lamps removed illustrates the sockets and the ballasts strapped to the underside. The wires running to the top ring

BILL OF MATERIALS

No.	*Quan.*	*Material*	*Size*
18	1	Fiberglas cement	2 Ounces
17	1	Fiberglas	38¾ x 50"
16	2	Plumber's strap	¾ x 11"
15	8	RHB wood-screws	1½ No. 8
14	14	Screws	1"–10–32
13	1	Cord	8'
12	4	Lamps	48" Fast start fluorescent
11	2	Switches	Heavy duty
10	8	Sockets	Fluorescent
9	2	Ballast	Fast start
8	1	Plug	Male electrical
7	1	Switch holder	⅛ x 1 x 14½"
6	2	Ballast holder	⅛ x 1 x 6½"
5	16	Strap	⅛ x ¾ x 1"
4	4	Cross strap	⅛ x 1 x 11 15/16"
3	6	Teak	¼ x 2½ x 9"
3	12	Teak	¼ x 2½ x 9"
2	18	Teak	¼ x 3 1/16 x 9⅝"
1	4	Teak	⅜ x 2½ x 72"

are taped together and secured in the center of the top ring with an eye bolt.

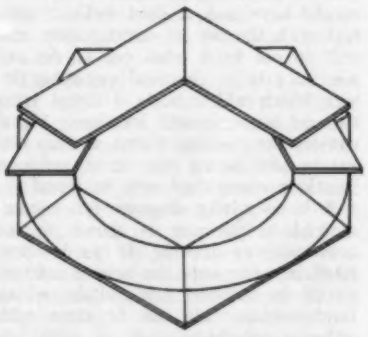
Fluorescent lamps were chosen because they give more light. No hot spots will appear on the shade nor on the ceiling. A word of caution, however, relative to the shade — fit the Fiberglas into position, mark lightly, and remove to cement.

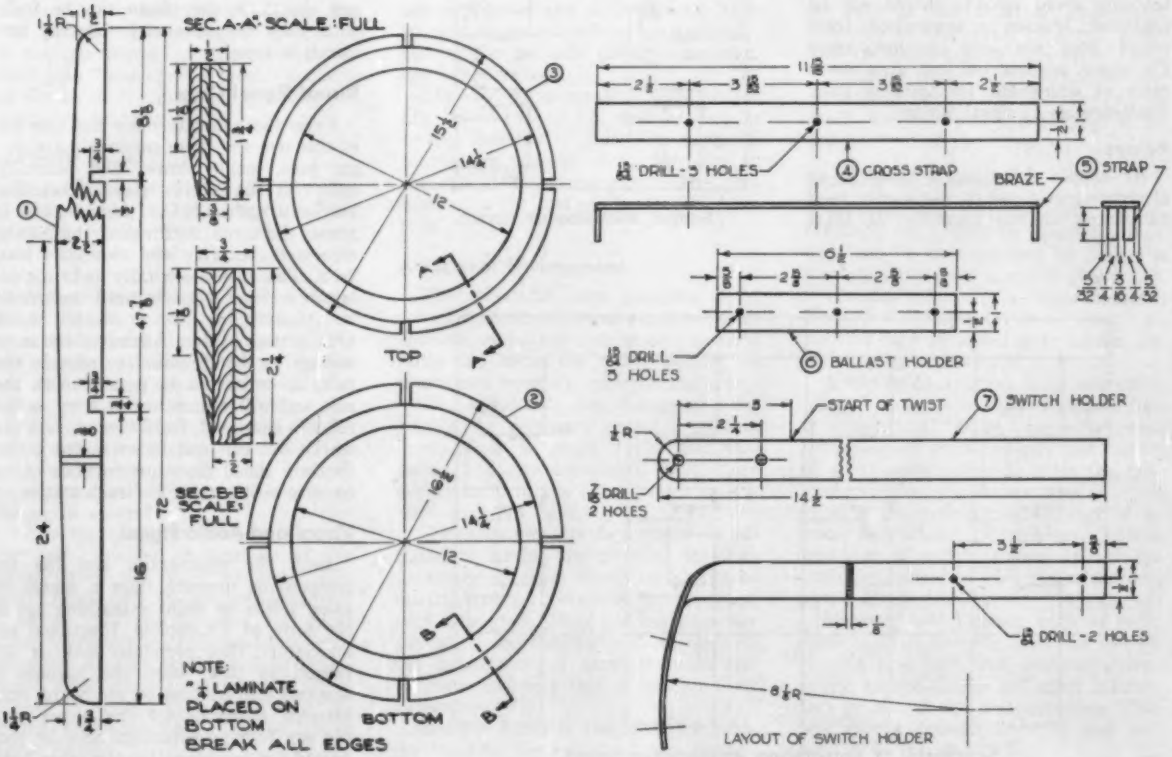
Before "pulling the switch" on this article, it might be pertinent to say that a project that is well constructed by the students will help to develop an understanding on the part of the administrator and parent as to the role industrial arts is trying to play for youth. When a project is shown at the open house, school display case, or in a store, the drawing of the project, the student's name, and a typed or lettered outline of student experiences should accompany the project. By having an accompanying list of student experiences, administrators, parents, and other students can readily identify the many facets involved in a project that seemingly are never apparent to observers.

Some of the experiences involved in making this lamp are as follows:

1. *Drawing*
2. *Layout*
3. *Woodworking*
   - *a*) Sawing — (1) radial arm saw; (2) circle saw; (3) band saw — (*a*) resawing; (*b*) multiple sawing; (4) scroll saw
   - *b*) Jointing
   - *c*) Surfacing
   - *d*) Fitting
   - *e*) Gluing
   - *f*) Clamping
   - *g*) Drilling
   - *h*) Finishing — (1) cleaning; (2) scraping; (3) sanding — (*a*) disk; (*b*) spindle; (*c*) belt; (*d*) hand (4) spraying
   - *i*) Assembly
4. *Metalworking*
   - *a*) Layout
   - *b*) Cutting
   - *c*) Drilling
   - *d*) Brazing
   - *e*) Grinding
   - *f*) Fastening components
5. *Electrical*
   - *a*) Layout
   - *b*) Cutting
   - *c*) Splicing
   - *d*) Soldering
   - *e*) Fastening components
6. *Miscellaneous*
   - *a*) Selection of shade material
   - *b*) Layout
   - *c*) Cutting
   - *d*) Cementing
   - *e*) Fastening

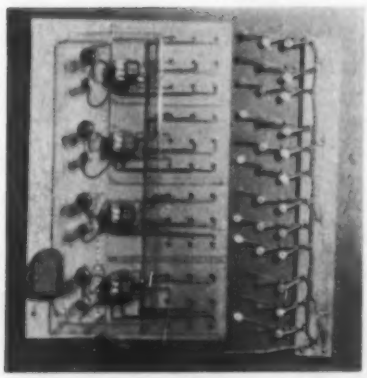
A view of how the wings are laminated.





ANNUNCIATORS FROM SALVAGE RELAYS

WALDEMAR E. KLAMMER
Department of Industrial Education
Western Michigan University, Kalamazoo

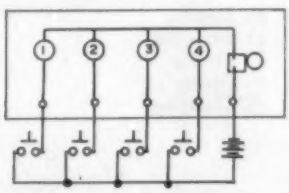


Since relays play such an important role in many electrical and electronic systems today, the use of relays in teaching about circuits should not be neglected. Making an annunciator from relays, then, not only can help serve the above purpose but can give one a piece of equipment for teaching basic fundamentals of signal wiring.

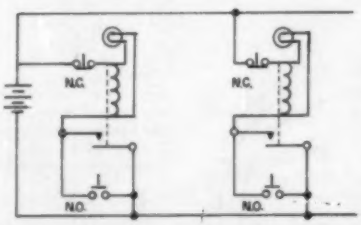
Relays

By simple definition, a relay is an electromagnetic switch commonly used to control circuits remotely. It takes very little effort to find that their sizes, shapes, and functions are nearly endless.

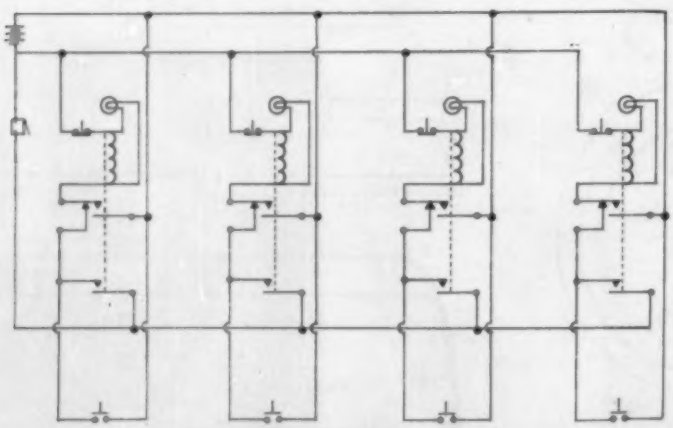
The term salvage relay in the title indicates that, with a bit of ingenuity, one can readily locate used relays which are functional — usually at little or no expense. A few places to investigate include government surplus equipment, dealers in juke boxes and other coin operated devices, or "specials" in supply company catalogs. Obviously they may need some revision to serve one's purpose but this too can often be used as a teaching aid by turning it into an experiment for advanced members of the class.



Annunciator controlled by four push buttons.



Simple annunciator circuit.



Schematic of four-station annunciator circuit.

Annunciators

It is surprising to know that many people have had at least indirect contact with the use of annunciators and still do not know what one is. An annunciator is an electrical switching device which will indicate a signal from two or more remote locations. Signal devices for hospital rooms and on elevators are among the more common locations where they may be found.

A basic wiring diagram for a commercial annunciator is shown on an accompanying drawing. If one is interested in using only the simple external circuit in teaching low voltage wiring fundamentals, this can be done with either a purchased unit or with one made from plans presented in this article. A more compact unit than the one shown in the photo can be built with only the necessary external terminals exposed.

Visual Signal Only

Even the simplest relay has one set of contacts and these commonly are single pole, single throw, and normally open. In the SPST relay circuit, the normally open (N.O.) push button is across the contacts. Pressing the button energizes the relay and closes its contacts. This then electrically locks the relay in a closed position until the circuit is released by the normally closed (N.C.) push button. A lamp of the same voltage as that required to operate the relay is connected in parallel with the coil and will remain on as long as the relay is energized. Only two sections are shown but this can be expanded to indicate a signal from any number of locations with a relay for each station.

Visual and Audio Signal

Both the photograph and the accompanying drawing show a means of using relays to build a teaching aid in the form of a complete, functional annunciator. This particular unit is arranged so that, when the harness is snapped into position on the board, only external terminals for the power supply and four push buttons need be connected for operation. On the other hand

a more complicated wiring problem can be given the student by having him do the complete hookup with jump wires and using a schematic diagram.

Nu-way snap connectors have been used on the unit shown. Jumpers are snapped onto appropriate studs until the entire wiring job is done. A different color wire leads from each stud to the various relay contacts, coils, lamps, etc. The schematic used when wiring is color coded to match these wire colors.

An examination of the wiring diagram will indicate that this is a four station unit. Each relay has two sets of contacts. The SPST contacts in this circuit serve to isolate the buzzer from the circuit except when needed for a momentary audio signal. Each of the four normally open push buttons (at remote external stations) will operate the same buzzer — but only when that button is depressed. You will notice that the circuit through the coil actuates the relay armature, thus closing the SPST contact. This places the buzzer into the circuit until that push button is released.

The second set of contacts on the relay must be bridging or continuity transfer contacts. The National Association of Relay Manufacturers define bridging as "a term to describe a contact transfer in which the movable contact touches the normally open contact before leaving the normally closed contact during the transfer action, thus never completely opening the circuit of the movable contact." If this part of the circuit does open, the armature will chatter and will not lock into the desired closed position. It is possible to accomplish this continuity transfer with single pole, double throw contacts, but the adjustment is extremely critical. It is not too difficult to convert the contacts into "make-before-break" contacts as shown in the diagram to obtain the necessary bridging action.

A Plastic Cover

Because the adjustment of the relay contacts could easily be disturbed by handling of the unit, a clear plastic cover has been placed over the relays. This accounts for the apparent lack of sharp focus on that section of the photograph. In this unit a jeweled light and a normally closed push button are placed adjacent to each relay. For our use we have four colors of jeweled pilot lights to match the identifying color of four terminal strips spaced at the corners of our electrical benches. Thus a typical hookup can be made and the annunciator will indicate the source of the signal control.

Since the relays which may be used and the intended applications of the annunciators will vary to meet individual needs only the schematic diagram is shown. No specifications for panel sizes, voltages for coil or lamp, etc., are given because these must be determined after relays have been obtained. It may be necessary, in some cases, to rewind the coils to fit the available power supply. □

HAM RADIO:
AN INCENTIVE FOR INDUSTRIAL ARTS ELECTRICITY-ELECTRONICS

RICHARD B. HAGE

Oakdale, Calif. (K6RRO)

Amateur radio is not new, having been in existence since the time of World War I; however, amateur radio has taken on new impetus, particularly in its roll as an incentive to education.

Amateur radio is a many-sided activity. It can mean talking with other amateurs throughout the country and the world. It can mean experimenting with high or ultra-high frequencies. It can mean service communications for disaster groups or for armed forces overseas.

To become an amateur radio operator, the Federal Communications Commission requires the prospective "Ham" to be a citizen of this government and to be proficient at sending and receiving International Morse Code. In addition to the code, he is required to know federal regulations as they pertain to amateur radio and radio theory. After passing the examinations, he is issued a call similar to calls given to commercial radio stations.

The cost of an amateur radio station can be as low as $25 and as high as several thousand dollars. The degree of satisfaction one can obtain by being an amateur radio operator is not in proportion to the cost of the station, however.

A Natural Environment

The industrial arts program of a school becomes a natural place to foster amateur radio, and conversely, amateur radio can foster the radio, electric, or electronics program of industrial arts.

The industrial arts laboratory can supply the necessary physical requirements such as room, tools, and materials for experimentation that other departments of the school, such as science, may not have.

The industrial arts department, in addition to having the physical facilities necessary, is more likely to have adequately trained personnel to supervise such a program. More and more teacher education institutions are recognizing the importance of amateur radio and they are including this as part of their curriculum.

Amateur radio is also giving a helping hand to the industrial arts department as a whole by attracting more of the "academic-type" student who, heretofore, stayed clear of the industrial arts program because of "scholarly snobbishness." Once this student has been in the industrial arts program, he soon finds other areas besides amateur radio that are of interest, either from the standpoint of an avocation or as a supplement for other courses of study.

The study of electronics is as difficult to comprehend as any other area of industrial arts and requires much correlation between the textbook and the laboratory work. It has been observed that many students, who might otherwise become discouraged by the theoretical side of electronics, find an incentive for continuing their studying by having an interest in amateur radio. This interest may be the result of a personal endeavor or the result of group activities such as a school radio club.

Amateur radio in the industrial arts curriculum should not be an end in itself, but rather the beginning of an end.

Instilling an Interest

How can the industrial arts instructor instill an interest in amateur radio? This can be accomplished by having a local amateur radio operator give a talk if the instructor isn't a "ham" himself. Even if the instructor is a "ham," an outsider may be called in to add to the authenticity of the talk.

A trip to an amateur radio operator's "shack" along with a live demonstration is even better. "Hams" are a co-operative group of guys and gals and can be of great assistance even after the program in the school has been started. If it is inconvenient or impractical to leave the school, perhaps an amateur who has a mobile station in his car could be invited to visit the school and give a demonstration.

Amateur radio groups, such as radio clubs or Civil Defense units, are usually glad to give talks and demonstrations. Invite administrators and other instructors to attend the demonstration. This will give a broader meaning and add prestige to the idea. □

special report

Industrial Arts Woodworking—Are We Using a Modern Approach?

EVERETT R. GLAZENER

□□□ *Developments in industry have become so rapid during the past decade that industrial arts programmers are hard pressed to update and upgrade the field's offerings.*

The area of industrial arts woodworking can well stand frequent analysis to determine how well it is keeping pace with industry.

The following pages provide a series of guides against which the I-A woods instructor can measure his current courses of study.

It is only proper that we should occasionally "take stock" of our woodworking programs so that they can be improved and progress with society as the individual situation justifies and demands.

A person finds an interesting evolution in studying the history of industrial subjects in education. Most of the time these subjects have kept pace with the changing social, economic, pedagogical, and psychological aspects of the nation. Progress during the past decade has been so great that all phases of education have had to re-tool for what speculation, imagination, historical precedence, and factual evidence can tell us about what lies ahead.

Friese wrote a statement several years ago that should be kept in mind concerning progress and industrial subjects:

"The very nature of this group of subjects is such as to stimulate experimentation. Progress has been made, but it must be kept in mind that change is not necessarily progress and that, on the other hand, historical precedent is not a guarantee of present acceptability any more than it is an assurance of obsoleteness."[1]

Sounds of the Minority

It is unfortunate that so much misunderstanding, loose verbal trickery or shifting of word meanings, and misguided personal opinion have entered our area of work to "cloud the picture." However, if we believe some of the personal statements and some of the writings in professional articles in recent years, we would almost be forced to assume that industrial arts: (1) should be relegated to the days of the horse and buggy, (2) should be materially deemphasized or even eliminated as an area of emphasis, (3) employs no modern practices, (4) teaches no worthwhile skills (mental or otherwise), (5) does not contribute to modern education in a space age, (6) is only for the illiterate or lower mentality student, or (7) briefly, is a "frill" subject with no solid content value. This list of "opinions" could no doubt be increased to a much longer list. Fortunately, these ideas are those of a misinformed minority.

Unfortunately, we sometimes hear the statement, "This teacher has had 20 years of experience," when all too often the statement has been made about a woodworking teacher who has had one year of experience compounded 20 times. Is it any wonder that the general public, especially parents of industrial arts students, begins to have doubts about the worth of a program when their children several years apart bring home too often the same shoddily designed and constructed tie rack, bird house, or foot stool? We shall hope that the situation described is steadily improving and is not indicative of the woods areas as a whole, or in fact is not representative of even a small segment of the entire industrial arts program.

Quite to the contrary, a much larger list of sound ideas and experiences could be compiled from written sources. These have been proposed and put into practice by many industrial arts and vocational-industrial education teachers and other educators — functional ideas and practices which counteract and offset this so-called "hysteria" evident in some circles by a few individuals.

[1] Friese, John F., *Course Making in Industrial Education* (Peoria: Chas. A. Bennett Co., Inc., 1946), p. 43.

Dr. Glazener is professor, Division of Arts, Department of Industrial Arts, Colorado State College at Greeley.

Required Readings

Did you read the May, 1961, issue of *Industrial Arts & Vocational Education?* Or were you so involved with closing out the semester that you laid it aside expecting to read it later? It is suggested that a real effort be made to read especially the "special report" section (see pages 48–70) and the Office of Education I-A Conference article (see pages 22 and 23). Every person directly or indirectly connected with industrial education should read these and see that administrators and other educators and laymen are given an opportunity to read them. These reports give a background of knowledge which should be thoroughly understood by laymen, administrators, teachers, and future teachers before delving into one area of the industrial program. Another special reading should include the article by Perry.[2] This article is a positive approach to bolster our basic beliefs and point out major misconceptions of others toward our area and what we must do to correct these misconceptions.

Questions of Importance

Let us limit our thinking to the one area of the curriculum of industrial arts — woodworking. Three questions were asked recently of approximately 50 teachers and administrators of industrial arts who represented 25 widely separated states. These questions were: (1) What are the present practices in woodworking courses at all levels of instruction in your locality which neither represent modern policies in the industry, nor to any great degree, teach basic and still needed skills? (2) What are your suggestions for new areas for a contemporary woods area? (3) What is the present practice in teaching the woods area?

These lead to other questions. What are we teaching in the area of woodwork which contributes to a socially useful, skilled working force and/or to the intelligent consumer in our space age? Has our woods program kept pace with modern developments? Is everything that is new considered good and everything old considered bad? Should the woodworking area be de-emphasized?

The consensus of responses showed that the woods area should not be de-emphasized but revitalized and enriched; that other areas such as power, electricity, and graphic arts should be emphasized more than at present; that the best ideas of both the "old" and "new" be incorporated in a program for improvement; that we were contributing to a more intelligent society; but that our woods program was not keeping pace with modern developments in design, use of materials, relationship to industrial processes, integration with other subjects, and modern methods of teaching. More response was given to the first two than to any of the other factors; the others are listed in descending order of importance, according to the group.

From different, widely separated states, at least three teachers of subjects other than woodworking, reported that during the first period of instruction in woods in their college or public school locality, the student was taught proper tool sharpening, usage, safety, and other basic fundamentals pertaining to tools, materials, and hand equipment. Second, they "progressed" to a set group of exercises in joint making not directly related to a project or industrial processes and were graded progressively from one joint to the next as approved. They did finally get around to choosing and planning a project and bringing in other related information pertaining to woodwork. Some of these ideas have merit, but the methods employed could not be condoned as a proper modern approach in the teaching of woodwork on any level of instruction.

Bases for Discussion

A basis for discussion of problems in one area should be established before proceeding further, realizing the extensive variation of industrial programs from the small school, one-teacher industrial arts program possibly including woodwork and drawing (or in many cases at best a four-area general shop) to the multi-phasic curriculum of the large city program involving numerous teachers and areas in industrial arts, vocational-industrial education, and technical education. This must limit the ideas to be expressed as those generally for the program and toward basic fundamentals in any type of program.

In our present culture everyone has some need for technical understanding to meet intelligently the needs in modern living. This is true for both boys and girls. To understand many of our modern problems of international concern, national defense, health, transportation, and communication, the person must have some knowledge of industry — its tools, materials, organization, processes, and production. This knowledge is equally important when the various phases are considered for the ever-increasing leisure time activities.

Education may be divided into a few or many broad areas as desired by an individual, but the evolutional development of tools and machines (industry) has made America great.

The truly educated student must have a knowledge of the applied arts as well as the social studies, sciences, mathematics, and other curriculum areas. To give meaning to all areas and supply an orientation for selection and preparation of an occupation or vocation, emphasis must be placed on several objectives or parts of objectives for industrial arts. Special emphasis should be given to materials and processes as related to technical problem-solving skills and in developing an objective understanding of industry and its place in our culture. A special effort should be made to help discover and develop students who are particularly talented in the technical areas and applied sciences as we develop a measure of skill in each student in the use of common and special tools, materials, and machines. Safety, planning, and design to include drawing and its interpretation would be given special emphasis.

It is not necessary to discard everything that is being done and begin anew. We cannot overlook the progress which has been made in our present-day technology. It is not a matter of de-emphasis, but one of revitalization and proper re-emphasis of those important phases of woodwork.

With these statements as a basis for thinking, the following subjects will be discussed as those most pertinent to the subject: Design in Woodwork and Use of Materials.

Design in Woodwork

The project in industrial arts is or should be the means to an end and is the core of our teaching. Is it possible that too many teachers in industrial arts are using it as literally the ultimate end product? Design is inherent in everything produced. Whether it is right or wrong, often the entire program is judged by the design and appearance of the project. Design is not just a set of formulas and rules and is being neglected in woodworking and the industrial arts. Improvement is being made slowly, but Tinkham[3] found that too few individuals in industrial arts had realized the significance of design as it applies to this area of learning.

Millions of dollars are spent annually by industries on designing new products. It is probably safe to say that industrial arts, especially the woodwork area, is not representing modern policies in industry nor teaching some of the basic and needed skills in design.

A teacher from a far northwestern state writes: "Students dislike designing. so individual design in projects is not emphasized. There are many published plans that students like, so they are used." The old familiar statement is heard — "There isn't enough time, so I just give them a drawing of the required project." This rings the bell for

[2] Perry, Kenneth F., "Credo for a Renaissance in Industrial Arts," *IAVE*, 49:14, June, 1960.

[3] Tinkham, Robert H., "Design in Industrial Arts," Ph.D. thesis, University of Minnesota, 1952.

(Continued on page 42)

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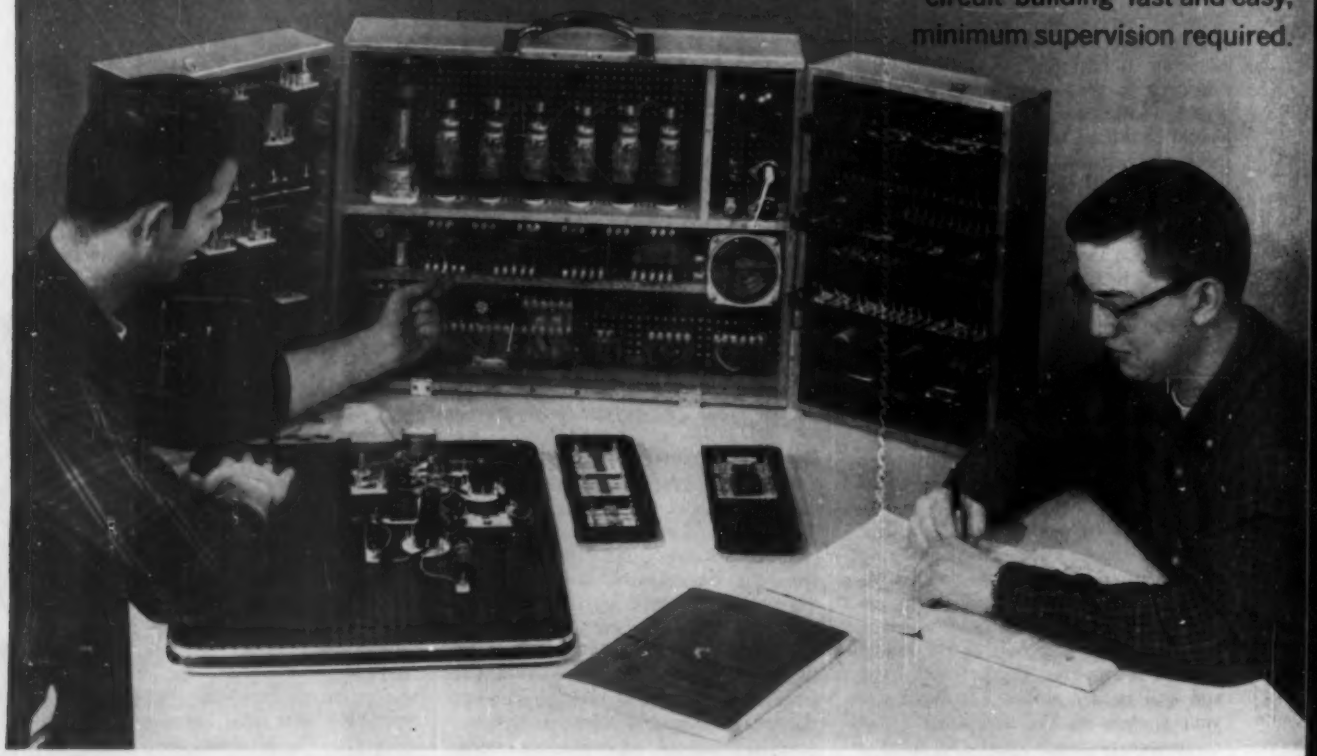

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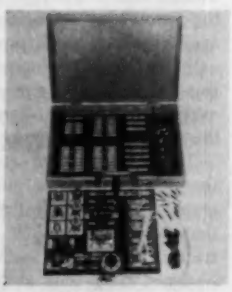

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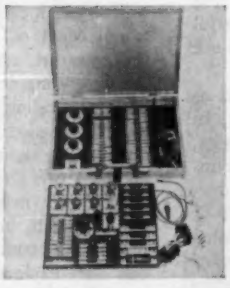

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WOODWORKING

(Continued from page 39)

no or poor preparation or just plain laziness. If nothing else, why isn't the history of design or other related information taught along with the project? Everyone knows that design is important and that if we adhere to one of our objectives of representing industry in our educational program that this aspect of learning and application related to this industrial arts curriculum should be stressed whether it is in woodwork or other phases of the work. There may not be anything completely original or new, but the students can be directed toward proper arranging and creating combinations of lines, forms, and colors to produce useful objects.

Products from industry are designed with the idea of what a customer wants and who will use the product. The designer must know something about the machines of production, the materials to be used, and he must have a background library of design ideas.

In a recent article on design, some functional ideas are expressed relative to woodwork.

"Modern thinking in the realm of design may reject the thought of studying the history of design. There seems, at present, to be a concerted effort on the part of some "moderns" to prove that anything that is new is good and everything that is old is for the "die hards" and "fogies."[4]

Designs and styles of the past have not always been functional or pleasing. However, many present-day styles and designs resemble early periods.

One can see in some of the new furniture, the lines developed by famous designers of former eras. What the modern designer is now often doing is using the well-known lines and countours of famous styles, removing the gingerbread — i.e., the carving and excess turning — and smoothing out the lines, with the result that the creations are beautiful in their simplicity and contour, and are more functional.[5]

Function of a product or project is only one major phase of designing. In one of a series of articles on design, Lindbeck[6] gives the good simple example of the "tin" can being very functional as a flower container, but it would hardly be suitable for the dining table. There are numerous phases of design and more of the aspects of design should be added to the program.

How long has it been since you visited a large furniture store or woodworking industry to observe changing designs and uses and combinations of uses of new and different materials? Do you look through the professional and special magazines to search for new design ideas and uses of new materials?

There is no better way of improving the instruction in woodwork and industrial arts generally than by introducing new processes and materials and studying these to reflect our changing industrial picture. Even those people in key positions immediately outside the field of industrial arts recognize the possibilities and needs, as Derthick[7] has said:

"Specifically it seems to me that industrial arts can strengthen its position in the high school program by more accurately reflecting our changing technology. Industrial arts should become more closely connected with the major problems of industry. New materials, new processes, new machines, new products should be reflected in the school program. For example, the study and use of transistors in electricity and electronics or the processes used in bending plywood to form modern chairs would seem to be appropriate experiences reflecting changes in our technology. It is in programs where this has not taken place that industrial arts has fallen into disrepute."

Laminating, Bending, and Forming

The recreational activity of water skiing is a universal leisure time activity for almost all ages. Many teachers are using the preformed kits for students who are interested in making water skis. There is some learning and value in various types of kits of pre-cut, preformed materials; however, the learning experiences will be many-fold greater when students design the forming and bending jig, strengthen the curved portion of skis and other objects by lamination, and then experiment by cold or hot bending of various woods such as white oak, hickory, ash, yew, or lemon wood. Most of these same woods and processes are adaptable to the bow for the expanding activity of archery. Laminating, bending, forming, and finishing a well-designed product for inside or outside use is challenging to students on any level. The projects are functional and involve many learning experiences not included in the traditional wood project. Questions such as the following can be explored. What pressure is needed to form certain woods? What type of wood is best? What properties of one wood make it better than another? Which glue is best for waterproof joints? What finish is best for projects subjected to water? Where is the hardware placed on skis for proper balance and performance? These are but a few problems to be faced with just one or two activities.

For the same type of operations and activities, but for the younger or less active "outdoor, nature lover," there are formed chairs, serving trays, arms and legs or other parts of chairs and projects. Veneers or solid wood, such as willow, may be added for use.

Mosaics, Leather, and Metal

What are you doing with scrap glass, ceramic and plastic tile, and scrap wood and veneers? The uses, sizes, designs, styles, and learning is unlimited when these materials are incorporated into the woodworking program through mosaics.

Leather and metal are other materials which add functional and decorative aspects to projects. It must be mentioned again that the project, whether it is an object or product of functional use and value or whether it is an "experiment" as commonly understood, is the core learning vehicle of industrial arts. Through these projects our purposes, aims, and objectives are accomplished.

The various mosaics and other materials mentioned are not new from the standpoint of age of use and manufacture. The "new" comes about when these items and ideas are adapted, combined, and otherwise used to enrich the activities and learnings which may have stagnated.

These activities can introduce the classes and individuals to numerous woods and other materials which are often neglected or never mentioned in a woodworking program.

For those especially in the small school program with limited facilities, space, equipment, and finances, the use of a combination of materials affords particular enrichment. For those in the general shop program — have you tried the "integrated area" project?

Resources are unlimited in almost any size or type of community for using a combination of "new" materials. The resources will be unlimited within your own school, when it is considered that the industrial arts teacher and students can bring about a better unification of courses, classes, and departments. Those who have the experience and background in fine arts, design, or other activities would no doubt be pleased to co-operate if the "shop" teacher does not feel that he has sufficient knowledge in design, science, or other categories to meet the changing needs.

Plastics and Fabrics

Probably the newest of materials related to woodwork are the numerous

(Concluded on page 46)

[4] Hardin, Robt. A., Wenrich, Ralph C., and Wright, Welcome E., "Concepts of Design in I-A Teacher Education," *IAVE*, 50:33, May, 1961.

[5] *Ibid.*, p. 33.

[6] Lindbeck, John R., "Design Guideposts — Function," *IAVE*, 50:26, June, 1961.

[7] Derthick, Lawrence G., and others, "The New Image of Industrial Arts," *IAVE*, 49:26, Sept., 1960.

new books

Woodworking Technology

By James J. Hammond, Edward T. Donnelly, Walter F. Harrod, and Norman A. Rayner. Cloth, 411 pp., 7¾ by 10¼ in., illus., $6.80. McKnight & McKnight Publishing Company, Bloomington, Ill.

A new, comprehensive treatment of the fabrication of wood. "The underlying assumption of the authors," as stated in the foreword to the book, "is that the subject of wood and wood fabrication is many-sided." The content of the text is an attempt to present this many-sidedness; it is divided into 18 sections embodying 179 topics: introduction; design; wood (types, etc.); laying out; cutting stock with saws; hand cutting to basic form; machine cutting to basic form; filing; sanding; drilling, boring, and mortising; shaping circular forms on the lathe; joinery; fastening; veneering; laminating, bending, and molding; structures; pattern-making; finishing. In treatment of these many topics, the authors do touch upon a great range or breadth of areas in units common to most courses of study in woodworking on the senior high school and introductory vocational-industrial levels. The material, which was tried and tested over a period of 10 years, is developed by both "informational topics" and "instructional topics." Each operational topic is divided into considerations of classification, procedure, standards and result, safety considerations, and additional reading. The text is certainly a valuable addition to the works employing a comprehensive approach to the subject of woodworking.

Machine Tool Metalworking

By John L. Feirer and Earl E. Tatro. Cloth, 446 pp., 7¾ by 9½ in., illus., $5.75. McGraw-Hill Book Co., Inc., New York 36, N. Y.

An introductory text on the machining of metals. Rather than providing comprehensive coverage of every aspect of machine-shop work, the authors selected certain operations which research has indicated to be a substantial value and used frequently. The sections include an introduction, benchwork, drilling machines, engine lathe, shaper, milling machine, grinders, related information, and (46) projects (also has a very detailed glossary). The chapters in each section emphasize how machines operate, what cutting tools are and how they shape metal, how to determine speeds and feeds, and the essentials of mechanics. As an example, the section on "drilling machines" has units on types of drilling machines, twist drills, drilling holes in flat workpieces, drilling holes in round workpieces, reaming in a drill press, using other cuttings in a drill press, drilling machines in industry, and discussion topics and problems.

Machine Shop and Technology Tool Identification Kit

Cards, 101 in number, 5 by 8 in., illus., $4.50. The Interstate Printers and Publishers, Inc., Danville, Ill.

A unique set of flash cards of 101 common machine-shop tools. On one side of the cards, each of which is numbered, is the picture of the tool; the other side is blank. The key or master cards identified the tools. While most machine-shop instructors can make good use of the cards, teachers in smaller shops, which may not stock (or need) a complete line of tools can present a learning unit in tools through this visual aid. (The cards also eliminate the disruption of a toolroom for tool-identification sessions.)

Industrial Arts Drawing and Blueprint Reading

By Shriver L. Coover. Cloth, 312 pp., 7½ by 9½ in., illus., $4.80. McGraw-Hill Book Co., Inc., New York 36, N. Y.

A revision of the author's earlier textbook, *Drawing, Sketching, and Blueprint Reading*, this title in the publisher's series of "Publications in Industrial Arts" features: (1) simplified language for beginning students, (2) a greater number of shorter learning units, (3) a definition of each new drafting term when introduced in the text. In addition, the revised edition has many new drawings; a doubling of problems (from the first edition), many of which show projects to be made in the wood or metal shops; a functional use of second color, serving as a teaching aid by highlighting good drawing practices and pinpointing specific information on drawings. The sections of content in the new edition include: why we make mechanical drawings and technical sketches; elementary blueprint reading; simple sketching; the shop sketch; dimensioning a sketch; sketching pictorial cycles; the draftsman's tools; multiview projection; lettering; dimensioning; drawing and planning for woodworking; drawing and planning for sheet-metal work; practical geometry; sectioning; advanced blueprint reading; industrial and machine drawing; fasteners; architectural drawing and home planning; drawing and planning for electricity and electronics; pictorial drawing; graphs and charts. In addition, there are sections with advanced problems, a dictionary, a collection of standards and tables, information on how to grade your drawing.

Oscillator Circuits

By Thomas M. Adams. Paper, 128 pp., 5½ by 8½ in., illus., $2.95. Howard W. Sams & Co., Inc., Indianapolis 6, Ind.

Amplifier Circuits

By Thomas M. Adams. Paper, 136 pp., 5½ by 8½ in., illus., $2.95. Howard W. Sams & Co., Inc., Indianapolis 6, Ind.

The first two works in the publisher's new Basic Electronics Series. The first, on oscillator circuits, analyzes such oscillator circuits as the crystal; Hartley; Colpitts; tune-plate, tuned-grid; electron-coupled; phase-shift; blocking—as well as multivibrators and Thyratron saw-tooth generators. The introductory chapter covers circuit fundamentals. The second, on amplifier circuits, considers fundamentals and analyzes basic AF and RF circuits with chapters on such amplifier circuits as the basic vacuum tube; R-C coupled AF voltage; transformer-coupled AF voltage; audio phase-inversion; impedance-coupled RF voltage; transformer-coupled RF voltage.

A comment or two should be made here on the format of this series. The series' "dynamic new approach to the explanation of electronic circuit action" utilizes "unique four-color diagrams to help you visualize . . . exactly what action is occurring during every moment of circuit operation." The publisher compares this "moving electron" treatment as similar to visualizing the movements of parts of a mechanical device.

While the series may be most appropriate for use by students of electronics at the higher levels, its presentational use of multiple colors to illustrate "working models of circuit actions in diagram form" certainly does greatly simplify the material for understanding by industrial arts and vocational-industrial students.

Instructional Aids in Industrial Education

By Walter E. Burdette. Soft cover, spiral, 144 pp., 8½ by 11 in., illus. Division of Industrial Education, Arizona State University, Tempe, Ariz.

This is a superb collection of practical instructional aids for use in industrial arts education. The compilers are to be congratulated for the thoroughness of their listing, which has a wealth of eminently usable material. The listings are grouped under aeronautics, automotives, crafts, drawing, driver education, electricity and electronics, general woods and construction, graphic arts, metals, teacher education, and transportation. Information given with each listing includes type of aid; title; sound; color or not; time; rental, purchase, or free; where available; description; and level (high school, college, and/or adult). While the description for each teaching aid is necessarily brief, it should be complete enough to enable the instructor to evaluate the value of the aid for the particular teaching-learning unit into which it would fit. The final chapter, on sources, lists the addresses of the companies or governmental agencies from which the aids are available.

While there are many such catalogs in various forms, this one is easily the most complete, modern, and the most directly related to industrial education. Its value will be retained, of course, only if the compilers are able to keep it up to date; the field of industrial education would receive much practical value from this guide if it is kept current.

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ROUNDTABLE

(Concluded from page 20)

mum of four fields (metals, woods, electricity, and technical drawing, for instance) can be presented in a one-year course. Metals is, in its own right, a field of study, as are woods, fibers, or graphic arts. The forging of metals is also a field of study. Roughly the equivalent of each is worth a year's study in any high school.

In summary, let us keep the industrial arts in the public school concerned with the creation of high quality three-dimensional objects (and all the vast problems, and knowledges inherent in their creation) in common materials using basic processes. When the climate of opinion in the society dictates that new subject matter be introduced into the curriculum, and when that material is related to the industrial arts field, let us assume leadership in promoting the new subject matter; but, let us call it what it really is. While realizing the catholicity of our field, let us invoke a self-imposed limit on the number of subjects covered in our survey offerings and in the same manner severely curtail our tendency to become too specialized on the secondary level. □

HOWARD S. DECKER
Head, Industrial Arts Department
Appalachian State Teachers College
Boone, N. Car.

"Changes must be . . . directed toward a more realistic approach involving an interpretation of industrial technology."

American education is faced today with both a dilemma and an opportunity. The dilemma exists because it has become the "whipping boy" for many of the shortcomings of contemporary American society. When Russia launched its first "Sputnik," Americans were jolted into the realization that they were no longer first in everything. Something had gone wrong. Someone was at fault. The burden of the blame was placed upon the educational system. With this blame has come a great opportunity. People, many of whom thought little of it before, are showing an acute awareness to the problems and the shortcomings of their educational system. Education has become the spearhead, the great influence, the hope for world leadership and even for survival.

Industrial arts, as a major segment of education, must take a principal part in the opportunity brought about by this new awareness. More than any other area of the curriculum, industrial arts has the responsibility to interpret,

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to reflect, and to stimulate the great industrial technology and its impact upon a free society. This industrial technology is the great force that has, in a century and a half, transformed a people from a labor bound agrarian society into a great civilization of plenty. The only function of education is to perpetuate or to carry on the way of life that has been brought about by this great force. Industrial arts must meet its share of the great challenge. It must provide for the needs of the young as it prepares them for this democratic-technological society.

Traditionally the organizational patterns of industrial arts have been based upon, and have changed little, from the old school shop or manual training concept. The major emphasis has been upon manipulative tool and machine skills with the project as the ultimate goal. The organizational patterns have centered about the craft trades — woods, metals, electricity, and graphics. This concept is a floundering thing often lacking in direction much of the time failing to keep pace with the rapidly changing technological society which it serves.

Industrial arts cannot long remain as a major area in the education of a dynamic free society as long as it continues this narrow limited approach to learning. The traditional organizational patterns must, therefore, be changed. Changes must be made away from the present patterns and directed toward a more realistic approach involving an interpretation of industrial technology and its effect upon the individual. It must be terminal in that it is the last formal [illegible]ication before adulthood. It must also be large enough in scope and function to be college preparatory. More and more the curricula of colleges and universities are being pushed to include professional essentials. This places a greater burden on the secondary and primary levels. This is particularly true in the field of engineering where there is a great need for technological knowledge and skills on the secondary level. Industrial arts must provide this.

These great challenges can be met if the organizational patterns of industrial arts are turned about and changed. These changes must be made in laboratories, materials, and in personnel. Teacher training institutions must attract the best of potential educators. Administrators must re-examine and re-evaluate their programs. Industrial arts must realize its great potential and along with the other areas of education meet the great challenge. □

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Lincoln High School
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associations

WASHINGTON OFFICERS

Newly elected officers of the West Central District of the Washington Industrial Arts Association are: Willard Rublin, president; and Arne Johnsen, secretary-treasurer. Both men live in Shelton, Wash., and teach industrial arts in the city schools.

Clyde Robb, Shelton, was appointed to the post of general programs chairman.

The district's fall meeting was represented by some 60 secondary schools. The dinner meeting and program, arranged by Mr. Robb, was sponsored by Simpson Timber Company, located in the same area.

NORTH CAROLINA GROUP MEETS

The North Carolina Industrial Arts Association held its annual fall meeting on Saturday, November 11, 1961, at Hill Junior High School in Winston Salem.

Charles R. Crakes of the Educational Service Department, De Vry Technical Institute, Chicago, was guest speaker, and he discussed the topic "Challenge of the Electronic Age."

Other highlights of the day included committee meetings, a business meeting, and visits with the exhibitors.

COMING CONVENTIONS

Dec. 3–5. American Technical Education Association, at Hotel Muehlebach, Kansas City, Mo. Secretary: William N. Fenninger, 22 Oakwood Place, Delmar, N. Y.

Dec. 4–8. American Vocational Association, Inc., at Municipal Auditorium, Kansas City, Mo. Exhibit chairman: Lowell Burkett, 1010 Vermont St., N.W., Washington 5, D. C.

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WOODWORKING

(Concluded from page 42)

synthetic fabrics and plastics. Besides the multitude of products in these categories, the study of other items derived from wood may be included — the use of waste chips and scrap for the pressed sheets of hardboard, perfume, turpentine and other tar and resin products, and many others included in construction.

The use of fabrics in upholstery can be fascinating and enriching to a woodworking program. Upholstering is not new, but there are many fabrics, design of products, hardware, and other materials used which are new and afford a large range of study, learning, and activities to give a modern approach to our lagging woodworking program.

Summary and Conclusions

Yes, it is believed that our woodworking area in the program as a whole may be stagnating. It is possible that too many have become complacent and fallen in the proverbial rut. Ideas now being incorporated into woodworking classes by some may be "old" or "new," but revitalization, changes, additions and/or deletion of activities, materials, and processes should be made. A critical analysis should be made by each person concerning his individual program. If steps of progress are made, certainly some mistakes are inevitable, but it would be better to make and correct errors than to perpetuate poor practices.

Design techniques and understandings are being stressed more in all areas of work. It behooves each industrial arts teacher to study all the aspects of design, the problems of the industrial designer, the influence of materials on design, and make this phase of learning a continuing process. Modern design in woodwork is lagging.

The use of new materials, processes, methods, and techniques should be incorporated in the modern, functional woodworking program. Enrichment, interest, and expanded learning can result from the use of the various mosaics, fabrics, finishes, leather, plastic laminates, metal, veneers, and other products of industry.

A broader integration should be made between science, math, fine arts, and other applied arts and woodwork.

Additional Ideas

Woodwork and its multitude of related products and activities is a natural activity for closed-circuit TV which is already in the experimental stages for industrial arts. Expansion is inevitable.

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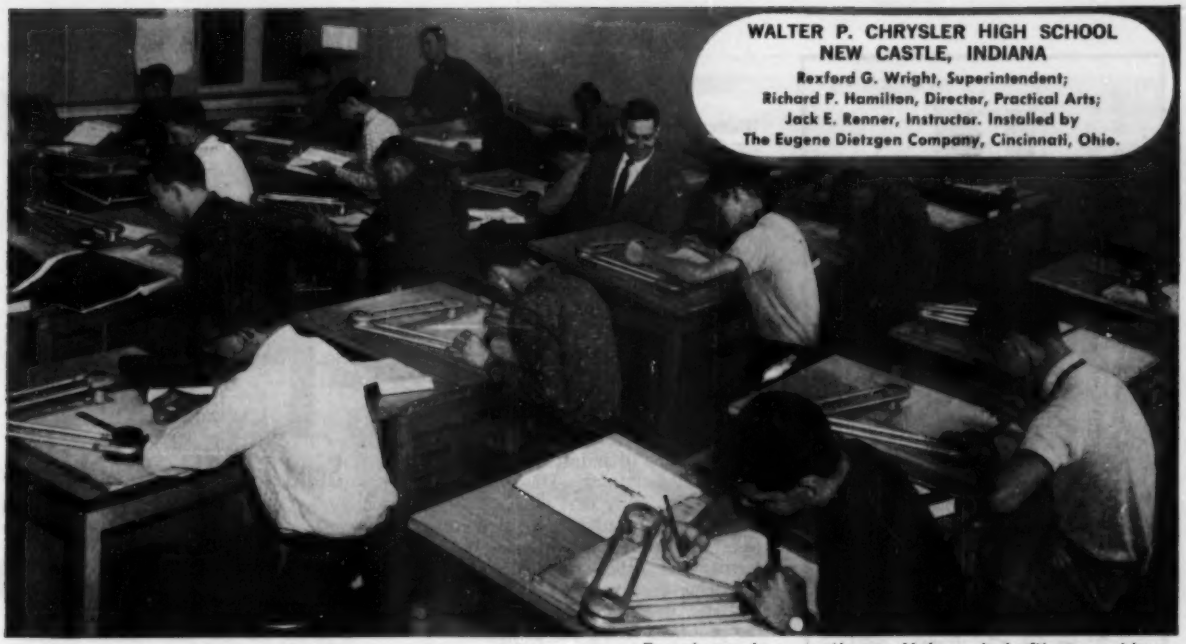

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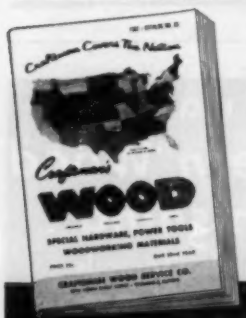

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RESEARCH

(Concluded from page 6)

trained in the techniques of research outside the college campus. Can this be blamed on a lack of interest on the part of the teachers or a lack of support by school administrators?

Current Procedures

An interesting picture of current research procedures was presented by Dr. King. He found that of the research studies made during the period 1950–55 almost 49 per cent were of the normative survey type. All other research methods ranked far below. This seems to pose some very real questions. Are the problems of industrial teachers best solved by a survey? Dr. Feirer found in his 1946 study that over 80 per cent of industrial education dissertations were of the normative survey type. It seems that other research procedures are being used more today than before but still need more emphasis to solve the problems facing our profession.

At the college level, the methods of research class for industrial educators is usually taught by a staff member of the industrial education department or a member of the education department. King found that in 75 per cent of the colleges he sampled the students majoring in graduate industrial education received their research procedures instruction outside the industrial education department.

Anyone who is teaching a methods of research class or who is interested in what is being taught should read Dr. King's study in full. It is available on microfilm from University Microfilms, Ann Arbor, Michigan. He presents a very detailed breakdown that is much too lengthy to present in this article.

Units of Instruction

Basically he found that of the units of instruction that were being taught in colleges over the country, 13 stood out with a high frequency of mention. These instructional units were: (1) methods and types of research, (2) college requirements and formats, (3) planning the study, (4) making a bibliography, (5) preparation of tables, (6) selecting a problem, (7) course orientation, (8) designing and interpreting illustrations, (9) citations and footnotes, (10) library sources for locating information, (11) organizing and presenting data, (12) designing and using the questionnaire, and (13) how to interview and observe.

Dr. King also studied the pattern of organization of research reports and found the typical dissertation consisted of: (1) title page, (2) acknowledgment, (3) table of contents, (4) list of tables, (5) first chapter, introduction, (6) second chapter, background of the study, (7) third chapter, procedures and plan of the study, (8) fourth chapter, gathering and recording data (one or more chapters), (9) fifth chapter, findings (one or more chapters), (10) sixth chapter, summary, conclusions, and

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recommendations, (11) bibliography, and (12) appendixes.

He found an increased emphasis on the use of an abstract and a vita as parts of the dissertation.

One especially interesting trend reported by Dr. King was the practice of lifting the "review of literature" out of the introductory chapter and either permitting it to stand alone as a separate chapter or integrating it with a section such as "background of the study." This trend will probably continue as the volume of research in industrial education grows. □

ATEA CONVENTION

(Concluded from page 10)

MONDAY, DECEMBER 4, 1961

2:00–4:30 p.m.

Topic: Meeting the Challenge

Chairman: William N. Fenninger, Executive Secretary, American Technical Education Association, Inc., Delmar, N. Y.

A. "What Industry Expects of Technical Institute Graduates"

Speaker: Walter G. Whipple, Professional Employment, Westinghouse Electric Corporation, Pittsburgh, Pa.

B. "Canada Meets the Challenge of the 60's"

Speaker: T. R. Sanderson, Principal, H. B. Beal Technical and Commercial High School, London, Ontario, Canada

C. "Automation and the Technical Institute"

Speaker: C. R. Crakes, Educational Consultant, DeVry Technical Institute, Chicago, Ill.

D. "Meeting Needs for Technical Education Through Extension Classes"

Speaker: John E. Fortin, Director, Division of Adult and Occupational Services, Rockford, Ill.

Recorder: Ray Wallis, Assistant Director for Instruction, Arkansas Vocational Technical School, Pine Bluff, Ark.

Host: Robert Forbes, Co-ordinator, Paseo High School, Kansas City, Mo.

TUESDAY, DECEMBER 5, 1961

2:00–4:30 p.m.

Topic: Joint Meeting with National Association of Industrial Teacher Educators

Chairman: Rupert N. Evans, President, NAITE Associate Dean for Administration, College of Education, Univeristy of Illinois

Reports:

1. Committee on Recruitment and Education of Teachers of Technical Subjects

Chairman: M. Ray Karnes, Committee Chairman, Professor of Higher Education, University of Illinois

ATEA Committee Members: Joseph T. Nerden, Conn., and George W. Morgenroth, N. J.

NAITE Committee Members: John A. Jarvis, Wis., and Joe L. Reed, Tenn.

2. Committee to Recommend Standards for Post High School Technical Education. □

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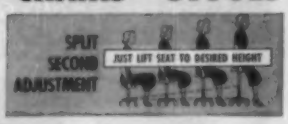

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personal

appointments . . .

☐ *Carl J. Knoll* has joined the staff at Michigan State University at East Lansing, in the industrial education department. He was formerly instructor of woodworking at Catonsville, Md., High School.

☐ *Henry R. Ziel* was appointed as assistant professor of industrial education at the University of Illinois, Urbana, effective September 1, 1961. He was formerly associated with a number of industrial organizations, The New York State Department of Education, and taught school in New York State. He has recently completed all the requirements for his doctor's degree from Wayne State University.

☐ *Carroll W. Smith*, formerly associate professor of industrial arts at East Carolina College, Greenville, N. C., was recently appointed State Supervisor of Industrial Arts. He is a graduate of Clemson College. Prior to going to North Carolina State College to complete his master's degree, Mr. Smith taught at Laurinburg. He is the immediate past president of the North Carolina Industrial Arts Association.

☐ *Southern Illinois University*, Carbondale, announces new staff and graduate assistants in industrial education for the school year 1961–62. The graduate assistants are: *Gene L. Dahlin, Ray Yeargain, Russell Biekert, Carroll Nelson, Merle Dean Waller*, and *Mrs. Jean Preston*, who is teaching courses in *Construction Methods for Primary Teachers*.

George H. Francis has been employed as a lecturer. His specialization is in the area of radio and electronics.

☐ *Don E. Hepler* has recently been appointed Industrial Education Director of the McGraw-Hill Book Company. Mr. Hepler assumed his duties on September 1, 1961, moving there from California State College, California, Pa., where he had served as professor of industrial arts since 1958.

He has taught industrial arts at Avonworth High School, Pittsburgh, Pa., worked as an industrial designer with Rust Engineering Company, Admiral Homes, Union Switch and Signal, and Patterson, Emerson and Comstock, Consultant Engineers, and served as an army engineering officer during the Korean conflict.

Mr. Hepler has a bachelor of science degree in Industrial Arts Education from California State College, California, Pa., and the master of education degree in Vocational Education from the University of Pittsburgh.

In his new position Mr. Hepler will direct McGraw-Hill's extensive publications program in the fields of Industrial Arts and Vocational Education.

☐ *Corwin A. Hellmer* joined the industrial education staff at Iowa State University on September 1, 1961. His work is in the woodworking, cabinetmaking, and woodfinishing areas, and he also handles some drawing classes. He formerly taught in the Deerfield, Ill., schools for nine years, and more recently at Wahlert High School in Dubuque, Iowa. Mr. Hellmer also has taught drawing at the University of Illinois, at Navy Pier, Chicago, and Loras College, Dubuque, Iowa.

☐ *Blondy Scott* has been appointed associate professor of industrial arts at East Carolina College, Greenville, N. C. He was formerly an industrial arts teacher at Ashboro, N. C., High School.

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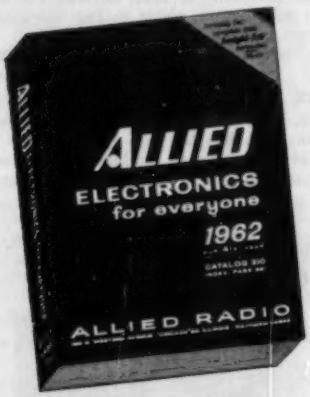

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☐ *Dr. H. L. Helton,* former chairman of the industrial arts department at Northeastern State College, Tahlequah, Okla., has accepted a two-year assignment beginning September, 1961, with Oklahoma State University to serve in Rawalpindi, West Pakistan, on their Pakistan Technical Education Program. The program is sponsored by the Ford Foundation, and its function is to assist the Government of Pakistan in the establishment of technical institutes offering the associate degree.

Dr. Helton is serving as adviser and teacher-trainer in the Rawalpindi Polytechnic Institute. He completed his first two-year assignment on this program in January, 1960.

☐ *Dr. W. F. Van Trump* has accepted the position of Chairman of the Industrial Arts Department, Northeastern State College, Tahlequah, Okla. He received his Ed.D. degree from the University of Missouri in June, 1961, and was formerly Vocational Co-ordinator and Director of Adult Education in the Columbia, Mo., Public Schools.

deaths . . .

☐ Robert Welch, 73, former Stout faculty member, died October 10, 1961, at Memorial Hospital, Menomonie, Wis. He had been a resident of Tainter.

Mr. Welch was born January 15, 1888, in Oconee, Ill., and had been a member of the Stout faculty from 1919 to 1927, as an instructor in metalworking.

He received a bachelor of education degree from the University of Arizona, a bachelor of science degree in engineering from James Milliken University, and a master of science degree from Colorado State College. He also attended Bradley Polytechnic Institute, Stout, and the University of Wisconsin.

Mr. Welch was the author of a book, *Elements of Sheet Metal Working,* and was a member of Epsilon Pi Tau, national industrial education fraternity.

☐ *Frank Steckel,* a member of the Portage County Board, and retired head of the manual arts department in the Stevens Point, Wis., High School, died on September 3, 1961, at St. Michael's Hospital.

Mr. Steckel was born January 3, 1886, in Menomonie, Wis., and attended Stout Institute. He spent the first four years of his 43-year teaching career in Upper Michigan. He came to Stevens Point in 1912 and was woodworking instructor and head of the manual arts department until his retirement in June, 1951. In 1952 he was elected to the County Board from the 8th Ward and had served continuously since then.

Fight TB

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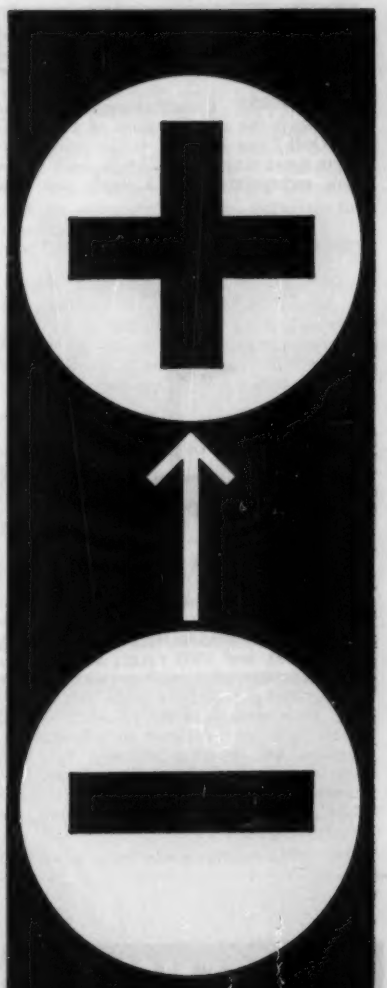

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equipment

drill press From Powermatic Machine Company, the announcement of a new 15-in. Drill Press — Model 1150 — with complete speed range and full 6-in. quill stroke now incorporated into a single unit. The

Drill Press Model 1150

Variable Speed model provides speeds of 475 to 4800 r.p.m., while the new Five Speed model provides speeds of 400, 840, 1580, 2800, and 5300 r.p.m., and features cast-aluminum-alloy pulleys with a large spring-loaded guard for easier belt changing. Both versions of the Model 1150 Drill Press have been designed to minimize deflection and increase accuracy for high precision work. Full details and specifications are outlined in Powermatic Bulletin 70-C, available upon request from the manufacturer.

(For further details encircle index code 1001)

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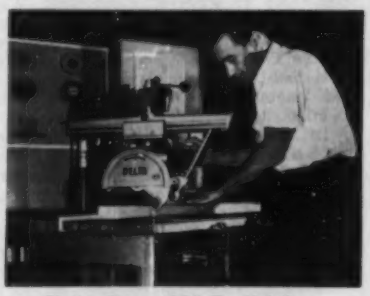
radial saw From Rockwell Manufacturing Company, Power Tool Division, a new improved 9-in. radial saw, called the Delta Super 990. It is designed for both the home and commercial markets. It fea-



Delta Super 990 Radial Saw

tures an up-front elevating handle for greater safety and convenience, and capacities of the new saw are: crosscut — 1-in. stock, 15 in.; maximum rip capacity, center of a 48-in. panel; maximum depth of cut, 2½ in.; and dado capacity with 6-in. dado, 13/16 in. wide. Many additional features are incorporated. For full information, please write to the company.

(For further details encircle index code 1002)

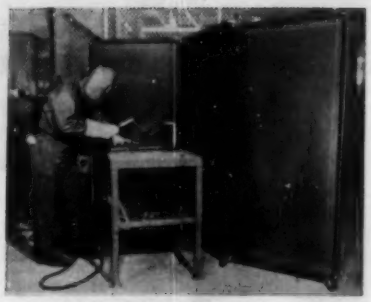
planers From Boice-Crane Company, new 16-in. and 24-in., one-piece, bed and frame thickness planers, now assuring the permanence of all critical relative alignments of cutterhead, feed mechanism, and

Boice-Crane Planer

worktable, due to the elimination of separate side frames and base. Improved planing performance on cabinet woods results from the unusually large (4¾-in. dia., 5¼-in. cutting circle) cutterheads. Drive motors are 3½ h.p. and 6 h.p., and feed motors ⅛ h.p. and ¾ h.p., respectively, for the two sizes. The motors are in a base compartment, shielded against entry of most shavings and sawdust. For additional information, write to the manufacturer. Literature will be sent to anyone upon request.

(For further details encircle index code 1003)

mobile welding booth From Can-Pro Corporation, the addition of "Lift-the-Dot" fasteners on the flameproof covers of the Can-Pro Mobile Welding Booth. This cover snaps on the all-metal frame, holds material taut, and snaps off quickly with nothing to lace or untie. Frame is ¾-in. metal, 6 ft. high, covered with heavy flame and fire-resistant duck. Four ball-bearing casters make it ready to move any time. Over-all size of the booth is 6 by 9 ft., and it can be folded for



Mobile Welding Booth with New Feature

compact storage and convenient handling. Also may be used as a chip shield, paint-spray enclosure, or draft control. For further information, please contact the manufacturer.

(For further details encircle index code 1004)

box and pan brake From The Peck, Stow & Wilcox Company, their new 36-in. capacity Box and Pan Brake — the PX36 — designed to combine the outstanding service and operational advantages of

Box and Pan Brake PX36

the Pexto PX24 brake in the larger sheet capacity. The new PX36 is available for bench mounting or with a steel cabinet floor stand. Outstanding major advantages are included. Complete information and literature are available.

(For further details encircle index code 1005)

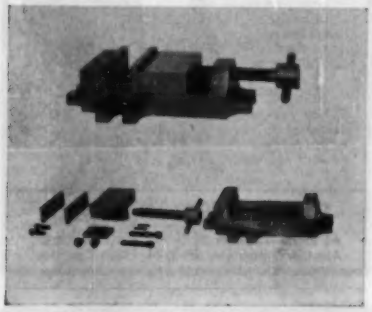
safety hand shank From McEnglevan, Inc., manufacturers of wire specialties and speedy-melt furnaces, their new development of the safety hand shank, in eliminating the hazards in shop and foundry classes of dropping a crucible of molten metal while pouring castings. The McEnglevan Safety Shank is available in both the hand shank and the two-man single-end

Safety Hand Shank

crucible shank. Further information may be obtained from established distributors of McEnglevan products or by writing direct.

(For further details encircle index code 1006)

vise kit shop project From U. S. Burke Machine Tool Company, a machine tool vise kit shop project, ideal in various milling, drilling, and boring operations — produces a sturdy, attractive milling machine and drill press vise. Kit comes com-

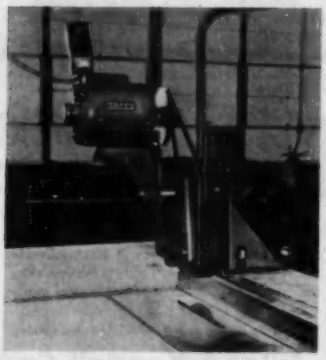


Tool Vise Kit Shop Project

plete with all necessary materials — castings, steel, fasteners, dimensional prints, and easy-to-follow instructions. Entire project can be produced on a standard milling machine, with the exception of the screw, which may either be turned on a lathe or die chased. Further information available upon request.

(For further details encircle index code 1007)

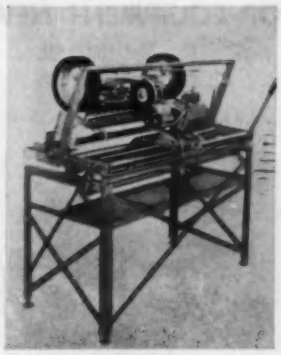
power feed unit for woodworking machinery From Belsaw Machinery Company, the new Belsaw feeder takes the hazards out of hand feeding by making the equipment completely self-



power fed. Used with radial arm, bench or band saws, jointers, shapers, and sanders, the new feeder is adjustable for vertical or horizontal mounting, with variable feed rates. It also provides for quick height and pressure adjustments for type and thickness of stock. It is powered by a ½ h.p. motor with a reversing switch; weight is 80 lb. Please write to the manufacturer for detailed information on the Belsaw Model.

(For further details encircle index code 1008)

lawn-mower sharpener From Foley Manufacturing Company, the sharpener that grinds both reel and bed knife of any reel-type mower while the mower remains fully assembled and in upright position is the featured model of an expanded line of mower sharpeners now offered. Built with the needs of institutional users in mind, the "Modern" lawn-mower sharp-



Lawn Mower Sharpener

ener is now made by Foley. The precision machine has a combination grinding head and a ½-h.p. electric motor with double end shaft. A 6-in. emery wheel grinds the reel blades. A 2½-in. emery wheel, mounted on second shaft, grinds the bed knife. Both grinding wheels are always in place, ready for instant use. The unit is quickly turned from one grinding position to the other. For further information on this sharpener and its accessories, please write to the manufacturer.

(For further details encircle index code 1009)

work station From Craftools, Inc., the Craftool Dust-Kleer Work Station is a self-contained, dust-free work unit that has an internal silent exhaust system that will pick up any dust and fumes at the

(Continued on next page)

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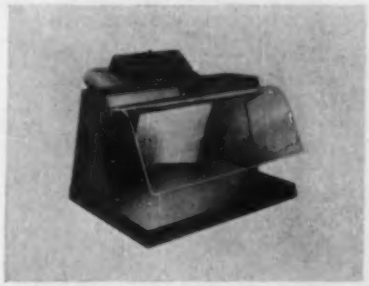
SHOP EQUIPMENT NEWS

(Continued from previous page)

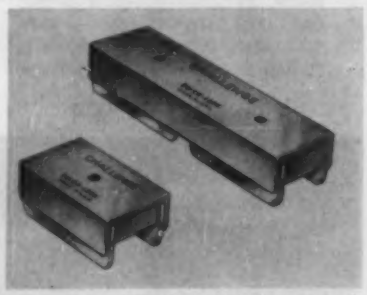


Dust-Kleer Work Station

point of work. A replaceable filter traps the particles, exhausting fresh clear air. No external duct is required. The unit has twin lights to illuminate the work area and a hinged Plexiglas eyeshield for safety and vision, and can be supplied in various work surfaces (Formica, plastic, or Transite) depending on the type of work and assembly to be done. An accessory bracket for magnifiers, work holders, and other attachments is available. The Dust-Kleer unit measures 24 ½ by 18½ by 19 in. Further information available.

(For further details encircle index code 1010)

type lock-up magnets From Challenge Machinery Company, the new Quick-Lock Magnets which have plastic tops that make them easy to pick up, and an almost inch-wide stance that prevents tipping, offer greater ease and speed in making type corrections and in proofing. They hold the type firmly in place on the galley or bed of the proof press. Type



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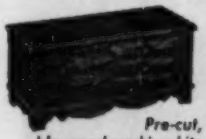

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changes can be made by sliding the magnets away from the form and back, and eliminate string tying almost completely. Two sizes are available: 1½ in. and 3¼ in. long. Write for further information.

(For further details encircle index code 1011)

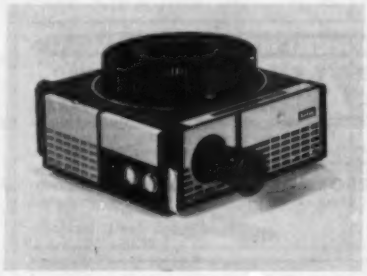
walkie-talkie unit From Electronic Instrument Company, Inc., this completely portable Citizens Band Transceiver No. 740 requires no license or permit for its operation. Weighs only 19 oz., including battery,

Walkie-Talkie Unit

and measures 7⅛ by 2⅝ by 1⅝ in. It is supplied complete with a nickel-cadmium rechargeable battery and charger. Model 740 is available in both kit and wired form, including battery, charger, and transmit and receive crystals for one channel. Both transmit and receive crystals are available for all channels. Unless otherwise specified, crystals for channel 16 are supplied with the set. Please write for further information.

(For further details encircle index code 1012)

projector From Eastman Kodak Company, the new Kodak Carousel Projector with its 80-slide, jam-proof, revolving tray which is as easy to place and change as a phonograph record. This high quality

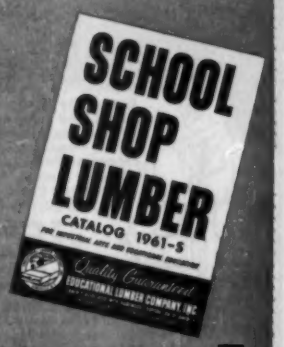


Kodak Carousel Projector

projector can be set for continuous, automatic operation, or be controlled manually with a remote, all-in-one-switch, to offer greatest flexibility in slide showing. Each long-play tray can be stored on a shelf like a book in its own indexed case. Slides are fully accessible for instant editing, yet locked in so that they will not spill even if the tray is dropped or turned upside down. The projector has a Kodak Projection Ektanar Lens, 5-inch, f/3.5 and accepts Kodak 3-, 4-, 7-inch and new Zoom Lens. It may be used with 35mm., 828, and super slides. Please write for further information.

(For further details encircle index code 1013)

(Concluded on next page)



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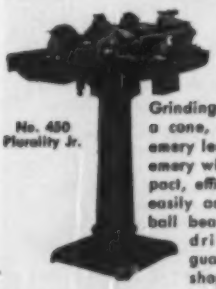

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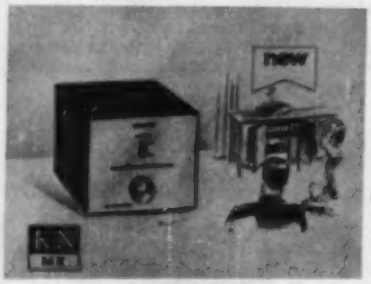
SHOP EQUIPMENT NEWS

(Concluded from previous page)

multiplex adapter From Allied Radio Corporation, a multiplex adapter which enables present FM tuners to receive stereo multiplex broadcasts. Designed to work in conjunction with any recently



KN-MX Adapter

made FM or FM-AM tuner, equipped with a multiplex output jack, the Knight KN-MX Multiple Adapter permits the viewer to enjoy 3-dimensional stereo broadcasts through a home stereo music system. Dimensions are 4⅞ in. high, 5 in. wide, and 7⅝ in. deep, and is offered in a metal case with dark brown-textured finish and polished brass panel. Described in the company's 1962 catalog, free on request.
(For further details encircle index code 1014)

folding rules From Stanley Tools division of The Stanley Works, their new "Life Guard Yellow" folding rules with new abrasion-resistant finish. A major breakthrough in rule surface protection, "Life Guard Yellow" not only provides exceptional abrasion resistance, but also resists most oils, acids, and alkalies. Color studies prove that yellow offers maximum visibility for accurate reading under difficult conditions. Two 6-ft. folding rules are offered—No. 6LG rule, and No. X6LG extension rule.
(For further details encircle index code 1015)

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READER'S SERVICE SECTION

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The index and digest of advertisements below are provided for your convenience in requesting free product information, catalogs and literature offered by the advertisers and the manufacturers listed in Shop Equipment News. To obtain this information or literature, encircle code numbers, sign the card, and mail. Your request will receive prompt attention.

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